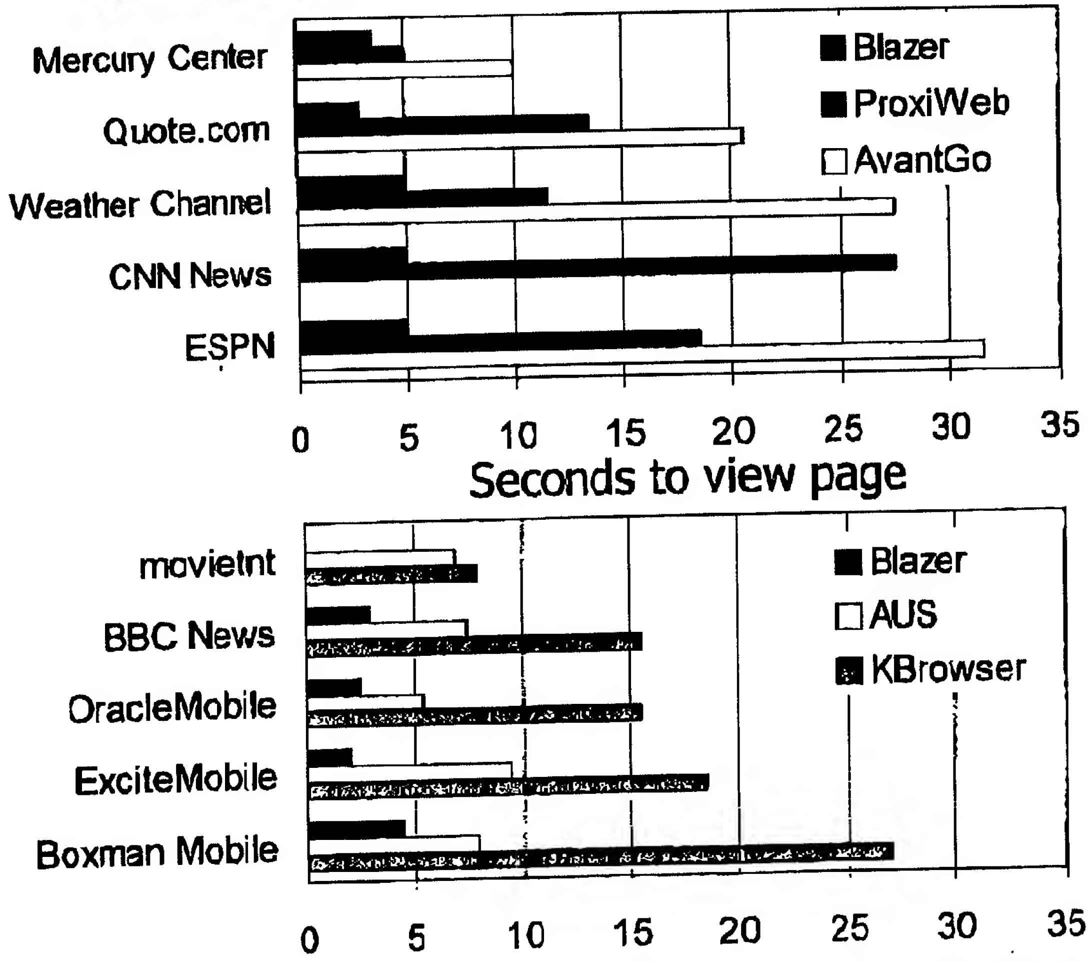
APPENDIX A

Business Plan

Bluelark Systems, Inc.

Speed Comparison

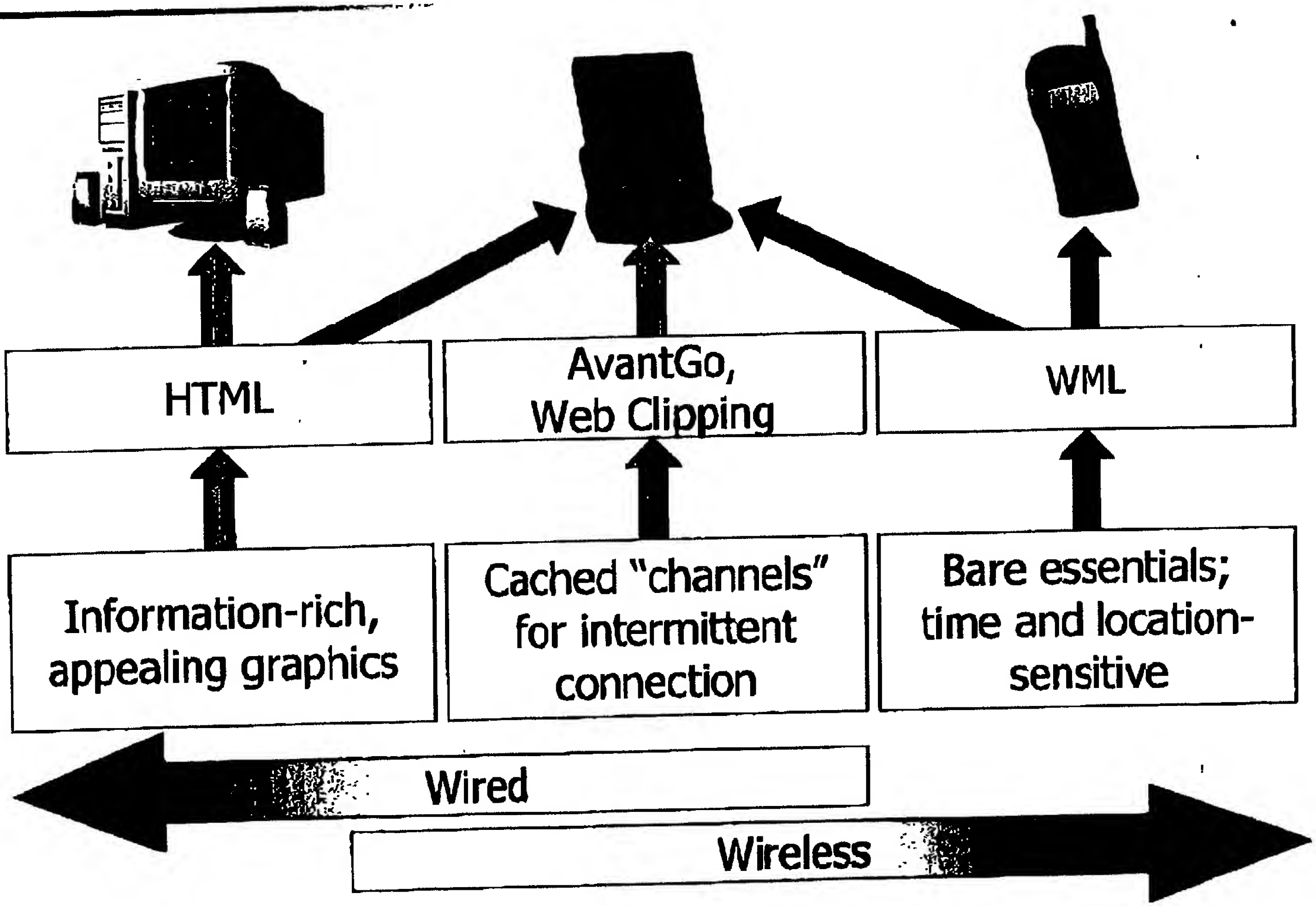


HTML Browsers

WAP Browsers

Tests simulated wireless performance using a wireline modem set at 19.2kbps

Content Converging on PDAs



Client

Format

HTML

AvantGo,
Web Clipping

WML

Content

Information-rich, appealing graphics

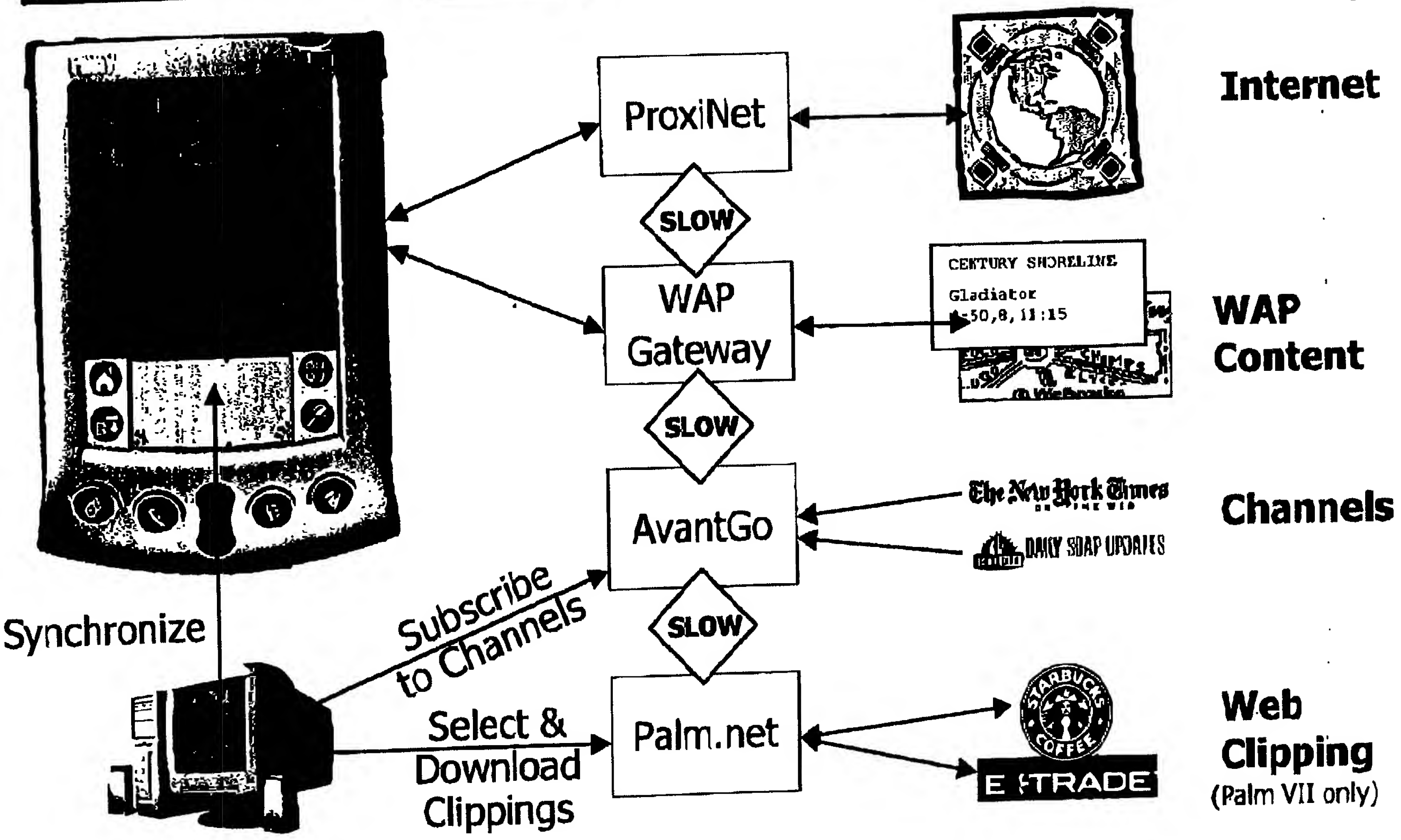
Cached "channels" for intermittent connection

Bare essentials; time and location-sensitive

Wired

Wireless

Current Solution



Synchronize

Subscribe to Channels

Select & Download Clippings

ProxiNet

SLOW

WAP Gateway

SLOW

AvantGo

SLOW

Palm.net

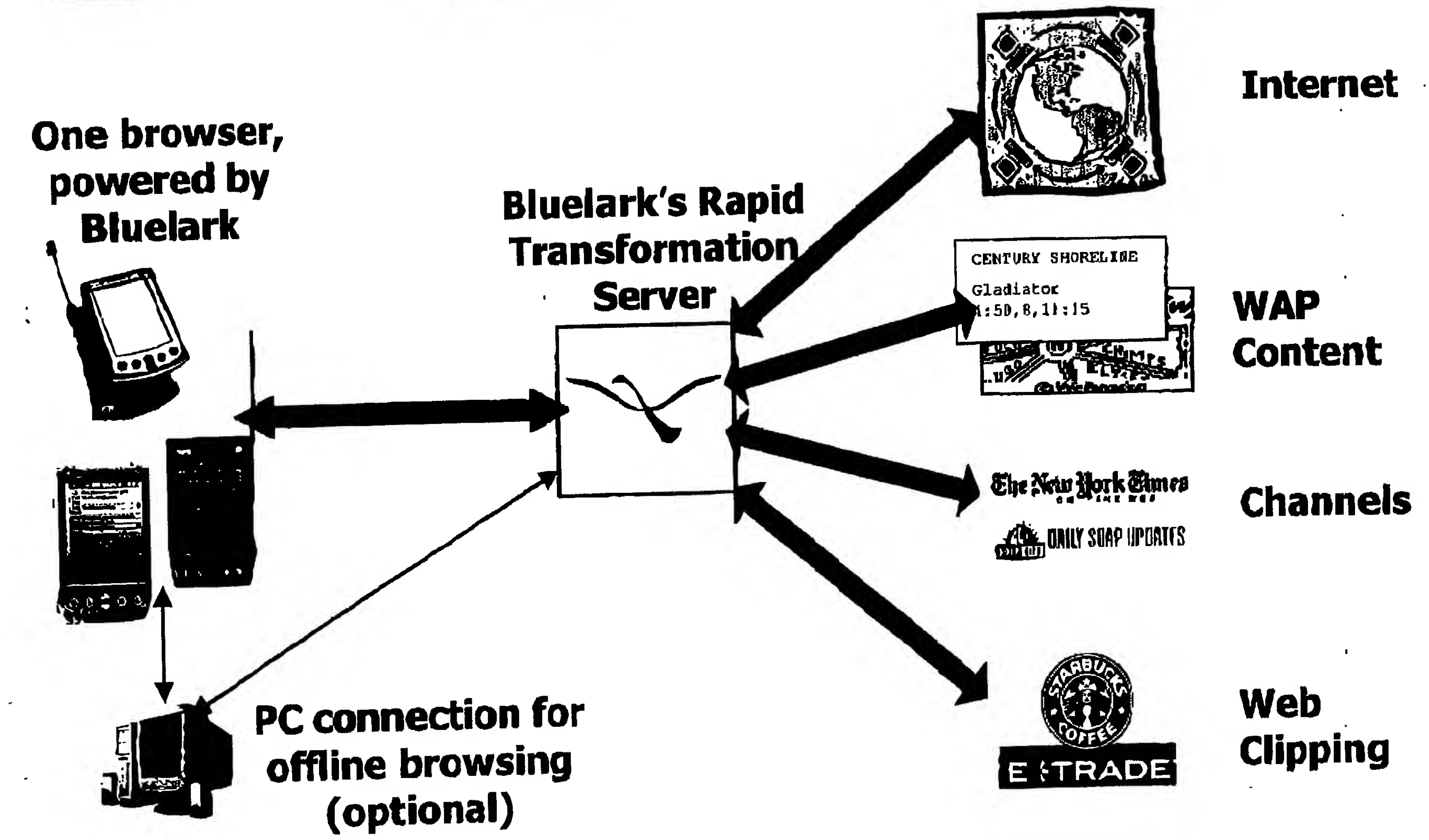
Internet

WAP Content

Channels

Web Clipping (Palm VII only)

Bluelark Solution



One browser, powered by Bluelark

Bluelark's Rapid Transformation Server

PC connection for offline browsing (optional)

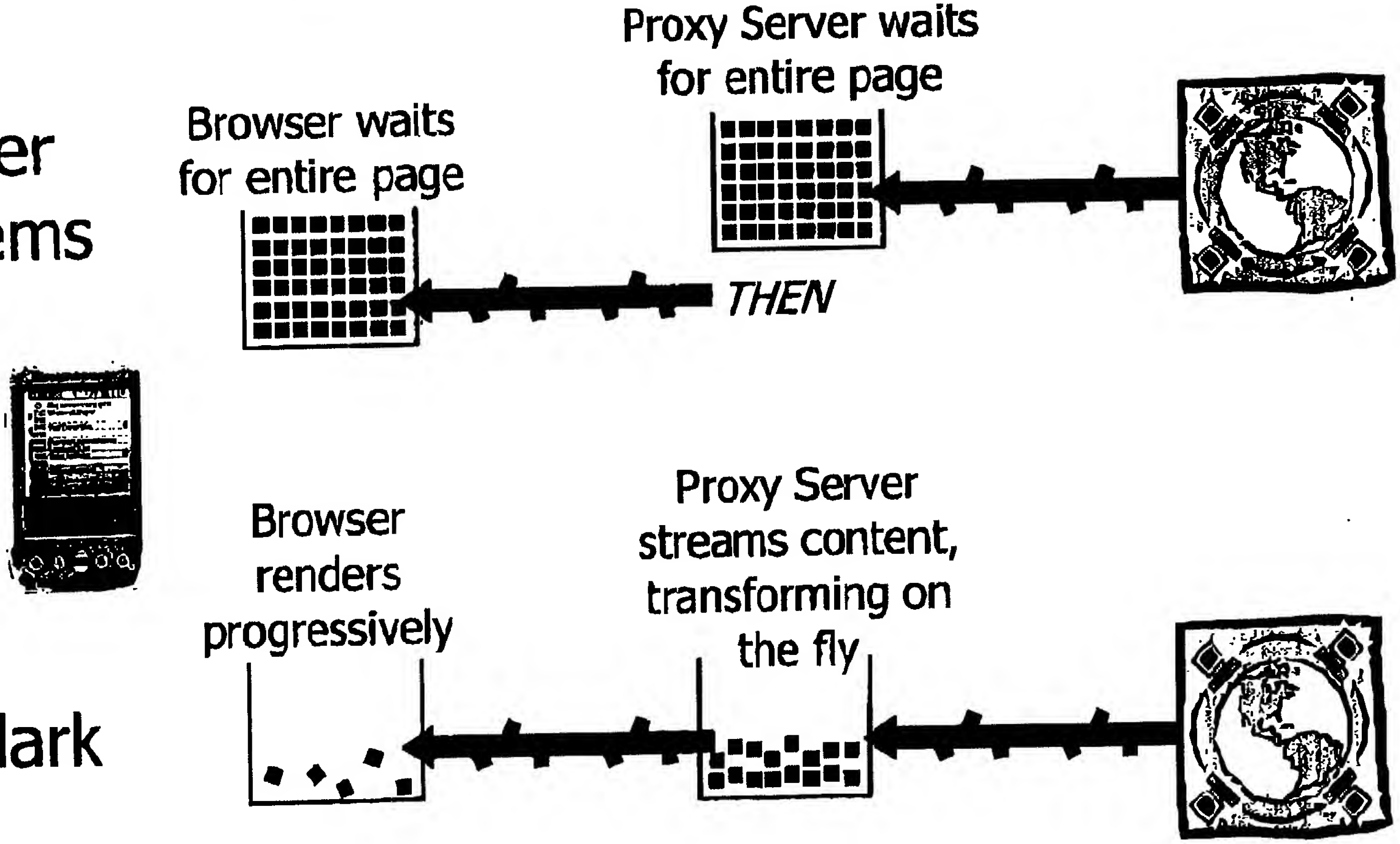
Internet

WAP Content

Channels

Web Clipping

Why The Difference in Speed?



Other Systems

Proxy Server waits for entire page

THEN

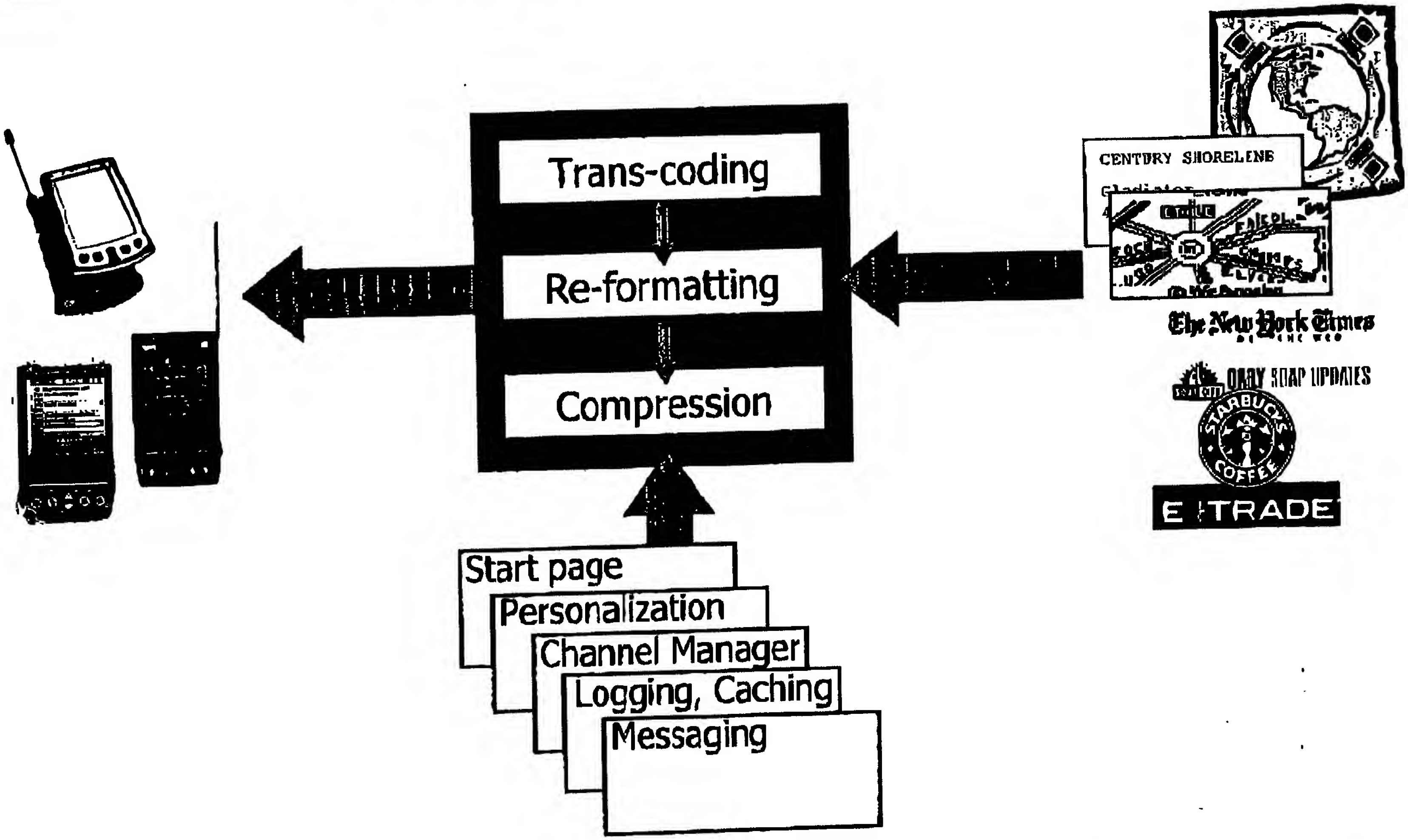
Browser waits for entire page

Bluelark

Proxy Server streams content, transforming on the fly

Browser renders progressively

What Does the RTS Do?



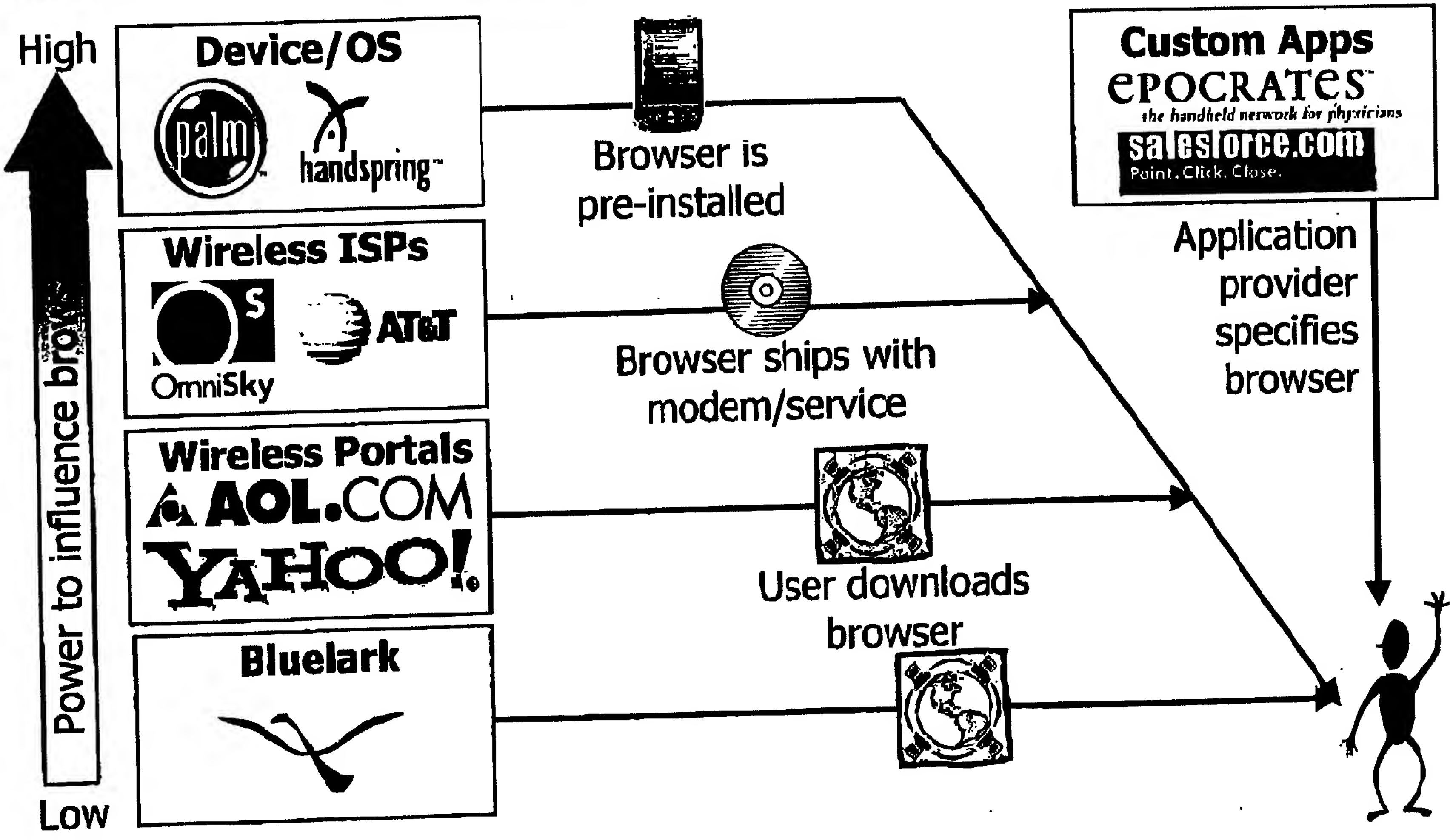
Trans-coding

Re-formatting

Compression

- Start page
- Personalization
- Channel Manager
- Logging, Caching
- Messaging

Distribution to the End-User



High

Power to influence browser

Low

Device/OS

palm handspring™

Wireless ISPs

OmniSky AT&T

Wireless Portals

AOL.COM YAHOO!

Bluelark

Browser is pre-installed

Browser ships with modem/service

User downloads browser

Custom Apps

epocrates™ the handheld network for physicians

salesforce.com Point. Click. Close.

Application provider specifies browser

Revenue Sources

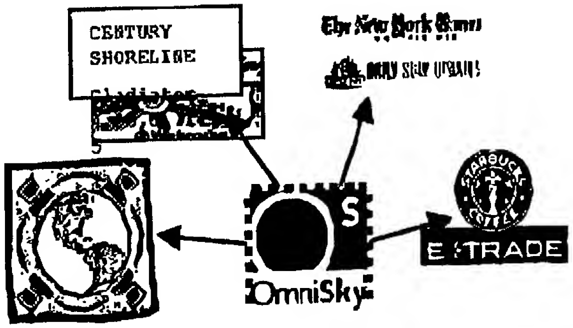
1. License technology to wireless ISPs
2. License customized browser to portals
3. Channel new users to portals
4. Customized applications and consulting
5. Platform for plug-in applications
6. Service & updates
7. Additional services to end-users

Objective: Become the standard Internet access platform for PDAs

1. License to Wireless ISPs

Benefits to ISPs:

- Give customers a better service
  - Fast access – "Think it, do it!"
  - The whole web
  - Channel manager
- Retain portal role
  - Fixed start page
  - Avoid being circumvented by users installing a better browser



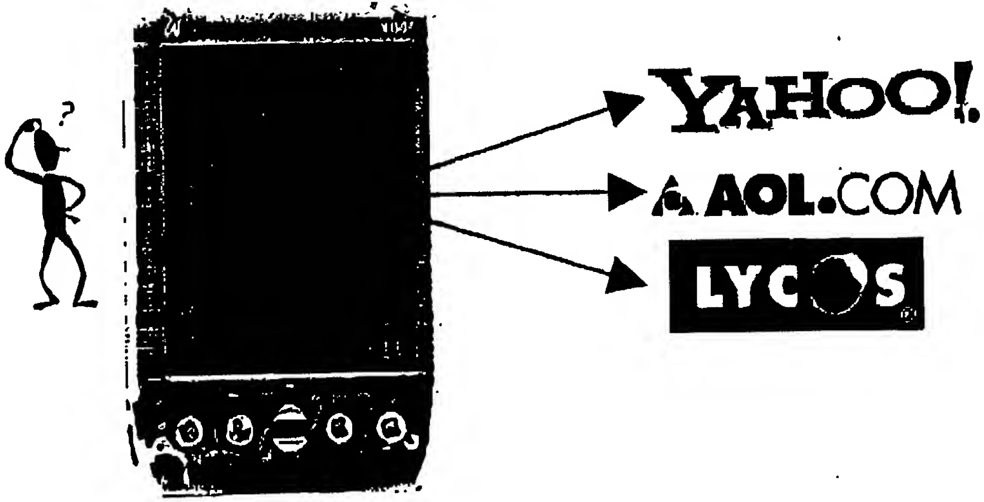
2. License to Portals

Benefits to portals:

- Be the AOL of wireless computing
  - Start-page is "hard-coded"
  - Move functions to PDA UI (e.g. Search)
- Use proxy-server connection to push personalized, location-sensitive, time sensitive content

3. Channel New Users

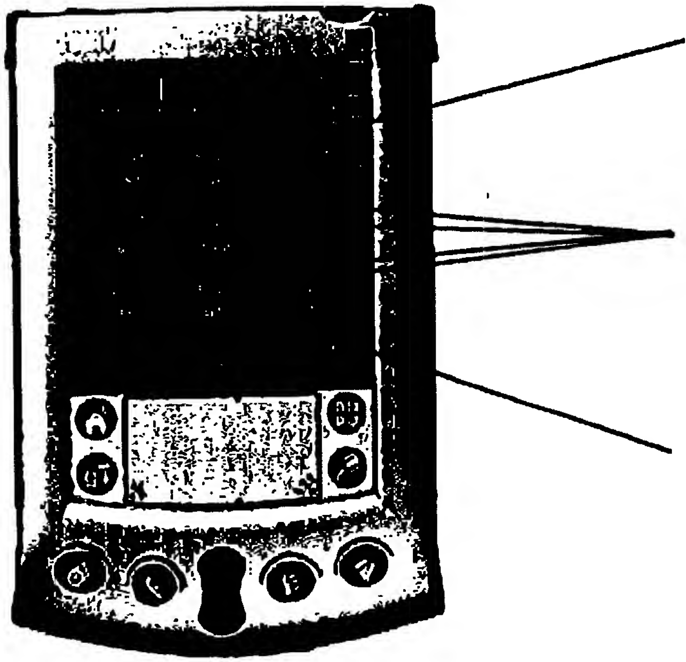
1. User downloads browser from Bluelark
2. Browser launches with Bluelark start page
3. User chooses a new start page from menu of Bluelark partners
4. Bluelark logs browser use and charges portal



- Portals pay Bluelark to be start-page partners
  - Listing fee
  - Per user fee
  - Click-through (per use) fee

4. Custom applications

ePocrates is the leading provider of real-time medical information delivered to the point of care



ePocrates qRx
drug reference

Proprietary web-based medical information sources (e.g. New England Journal of Medicine), delivered by customized versions of the Bluelark browser

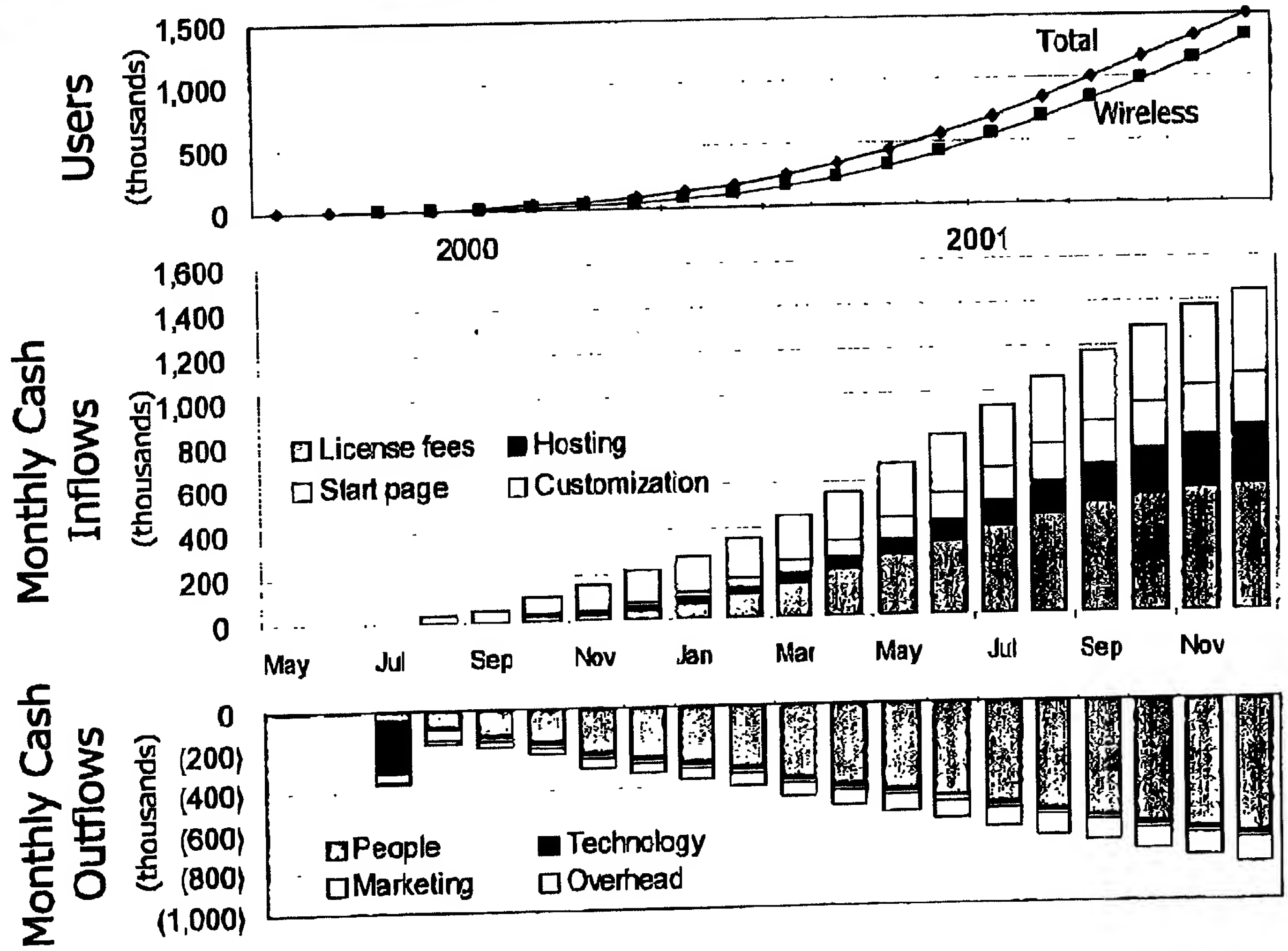
Standalone version of the Bluelark browser

- Bluelark gives ePocrates full control over the appearance, branding and delivery of information to physicians

Lots of Custom Applications

- Sales Force Automation (Siebel, Salesforce.com, ...)
- Facilities Management (Aperture, ...)
- Delivery Tracking and Logging (FedEx, ...)
- Fleet Management (SuperShuttle, ...)
- Construction Management (Cephren, BidCom, ...)
- Practice Management (McKesson/HBOC, ...)
- Group Scheduling (Evite.com, ...)
- Yellow Pages (AirFlash, Vindigo, Scoot, ...)
- Instant Payments (PayPal, ...)
- etc...

Cash Flow Projections



Assumptions

- Market Size (IDC)
  - 3 million U.S. wireless PDA users by 12/01
  - 17 million by 12/03
- License fees:
  - $1-$20 per user
- Recurring hosting & service fees:
  - $0.10-$0.30 per user per month
- Start page partners:
  - $5+ per user plus hosting fees
- Customization & consulting:
  - $150/hour

Exit Strategy

- Acquisition
  - Excellent match with PumaTech, Riverbed (Aether), Spyglass, Palm, Handspring, OmniSky, Yahoo!, many others
- IPO
  - Opportunity to become industry-standard platform

PDA Browser Competition

Company	Product	HTML	WML	Web Clipping	Offline Channels	Palm III/V	Palm VII	Other Devices	Images	Uses Proxy	Security	Strategic Focus
BlueLark	Blazer	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Certicom Jul-00	Software that enables fast, easy wireless PDA Internet use
AvantGo	AvantGo	Yes	No	No	Yes	Yes	No	Win CE	Yes	Yes	Certicom	Channel portal
Palm, others	Web Clippings	No	DP only	Yes	No	Soon	Yes	No	Cached only	Yes	Yes	Channel portal, add value to platform
ProxiNet (Puma Tech)	ProxiWeb	Yes	No	No	No	Yes	No	No	Squished	No	3DES/ SSL	Mobile device synchronization, development tools, personalized alerts
Qualcomm/ Kyocera	pdQ Browser	Yes	No	No	No	Yes	No	No	No	No	?	Unclear following sale to Kyocera
4thPass	KBrowser	No	Yes	No	No	WML only	Clipping only	None yet	WBMP only	Yes	?	Java software development tools. Minlu.com portal under development
Neomar	Neomar Microbrowser	?	Yes	?	No	Yes	?	RIM (eLink)	?	No	?	Mobile portal plus end-to-end WAP content delivery technology
AUSystem	AUS WAP Browser	No	Yes	No	No	IIIx and V	No	Ericsson phones +	No	No	?	Data communications software, with focus on mobile phones
The Edge Consultants	WAPMan	No	Yes	No	No	Yes	No	95/98/NT, phones	No	No	?	Unclear: Singapore-based consulting group
Pixo	Pixo Microbrowser	Yes	No	No	No	?	?	Phones	?	No	?	Mobile phone software (browser & PIM applications)
Microsoft	Pocket IE	Yes	No	No	Yes	No	No	Win CE	Yes	No	Yes	OS sales

Our system is the fastest by a wide margin, and the only one that reads the full range of Internet content. But more competition is coming…

Risks

- Technology risks fairly low
    - Should scale well, but not yet tested
- Market risks significant; will be resolved soon
    - Sales cycle may be longer than we expect
    - Adoption of wireless modems uncertain
        - Pricing & reliability are key
    - Need to move FAST!
    - Competition may get rough
        - What are Palm's plans?

Execution Challenges

- Grab share
  - Requires strong Biz Dev and Marketing
- Grow the organization fast
  - Maintain speed, flexibility and culture
- Scale ahead of the curve
  - Server & bandwidth infrastructure
  - Maintain user support
- Find all the customers
  - Don't let segments slip away

Core Team

Simon Mawby
B.A. & M.A. Oxford; MBA Stanford
Most recently Director of Product Development at ePocrates, Inc.
Background in Management Consulting, Sales and Sales Management

Jon Kleid
B.S. Computer Science, Stanford
Managed client-side development for ePocrates' qRx
Software Engineer at Sun Microsystems, Connectix and ForGolf

Ben Strong
B.S. Computer Science, Stanford
Managed Server-Side Development for ePocrates' qRx
Software Engineer at SpaceMachine and iCarz

Vivek Patel
B.S. Computer Science, Stanford
Managed database development for ePocrates' qRx
Software Engineer at MediaOne

APPENDIX B

Server Source Code

```
// MALConduitManager.cpp

#include "MALConduitManager.h"
#include "ace/OS.h"
#include "BLUtils.h"

#include "conduits/MALConduitDefs.cpp"

MALConduitManager* MALConduitManager::sInstanceP = NULL;

MALConduitManager*
MALConduitManager::instance()
{
    if (sInstanceP == NULL)
    {
        sInstanceP = new MALConduitManager();
    }
    return sInstanceP;
}

MALConduitManager::MALConduitManager()
{
}

MALConduitManager::~MALConduitManager()
{
    for (MALDatabaseMap::iterator i = mDatabaseTable.begin();
         i != mDatabaseTable.end();
         i++)
    {
        char *dbName = (char*) (*i).ext_id_;
        delete dbName;
    }
}

void
MALConduitManager::initialize()
{
    for (std::vector<MALConduitFactory*>::iterator i = mActiveFactories.begin();
         i != mActiveFactories.end();
         i++)
    {
        (*i)->initialize(this);
    }
}

void
MALConduitManager::finalize()
{
    for (std::vector<MALConduitFactory*>::iterator i = mActiveFactories.begin();
         i != mActiveFactories.end();
         i++)
    {
        (*i)->finalize();
    }
}

MALConduitFactory*
MALConduitManager::activateFactory(const char *name)
{
    for(int i=0; sFactoryDefs[i] != NULL; i++)
    {
        if (ACE_OS::strcmp(name, sFactoryDefs[i]->name()) == 0)
        {
            mActiveFactories.push_back(sFactoryDefs[i]);
            return sFactoryDefs[i];
        }
    }

    return NULL;
}

void
MALConduitManager::registerDatabase(const char *name, MALConduitFactory *factoryP)
{
```

```
    int factoryIndex = 0;
    for (std::vector<MALConduitFactory*>::iterator i = mActiveFactories.begin();
            i != mActiveFactories.end();
            i++, factoryIndex++)
    {
        if (*i == factoryP)
        {
            const char *nameCopy = BLUtils::strdup(name);
            mDatabaseTable.bind(nameCopy, factoryIndex);
            break;
        }
    }
}

int
MALConduitManager::getIndexForDatabase(const char *name)
{
    ACE_Hash_Map_Entry<const char*, int> *entry;

    if(mDatabaseTable.find(name, entry) == 0)
        return entry->int_id_;

    return -1;
}

MALConduitDispatcher*
MALConduitManager::makeDispatcher()
{
    std::vector<MALConduit*> *conduitsP = new std::vector<MALConduit*>();

    for (std::vector<MALConduitFactory*>::iterator i = mActiveFactories.begin();
            i != mActiveFactories.end();
            i++)
    {
        conduitsP->push_back((*i)->makeConduit());
    }

    return new MALConduitDispatcher(conduitsP, this);
}


MALConduitDispatcher::MALConduitDispatcher(std::vector<MALConduit*> *conduitsP,
                                                          MALConduitManager *managerP)

    : mConduitsP(conduitsP),
      mManagerP(managerP)
{
}

MALConduitDispatcher::~MALConduitDispatcher()
{
    for (std::vector<MALConduit*>::iterator i = mConduitsP->begin();
            i != mConduitsP->end();
            i++)
    {
        MALConduit* conduitP = *i;
        delete conduitP;
    }

    delete mConduitsP;
}

MALConduit*
MALConduitDispatcher::getConduitForDatabase(const char *name)
{
    int index = mManagerP->getIndexForDatabase(name);

    if (index != -1)
        return (*mConduitsP)[index];

    return NULL;
}

void
MALConduitDispatcher::sendInitialResponses(MALWriter *writerP,
```

```
                                                  BLClientInfo *infoP)
{
    for (std::vector<MALConduit*>::iterator i = mConduitsP->begin();
         i != mConduitsP->end();
         i++)
    {
        MALConduit* conduitP = *i;
        conduitP->sendInitialResponse(writerP, infoP);
    }
}

void
MALConduitDispatcher::sendNormalResponses(MALWriter *writerP,
                                          BLClientInfo *infoP)
{
    for (std::vector<MALConduit*>::iterator i = mConduitsP->begin();
         i != mConduitsP->end();
         i++)
    {
        MALConduit* conduitP = *i;
        conduitP->sendNormalResponse(writerP, infoP);
    }
}


// MALConfig.cpp

#include "MALConfig.h"
#include "MALConstants.h"
#include "MALConduitManager.h"
#include "MALConduit.h"
#include "ace/OS.h"
#include "BLUtils.h"
#include "xmlparse.h"

MALConfig::MALConfig()
: mConduitManagerP(MALConduitManager::instance()),
  mInterface(NULL)
{
}

MALConfig::~MALConfig()
{
    delete[] mInterface;
}

int
MALConfig::readConfigFile(char *fileName)
{
    ACE_HANDLE infile = ACE_OS::open (fileName, O_RDONLY);

    if (infile == ACE_INVALID_HANDLE)
    {
        ACE_ERROR ((LM_ERROR, "%p\n", fileName));
        return -1;
    }

    XML_Parser parser = XML_ParserCreate(NULL);
    XML_SetUserData(parser, this);
    XML_SetElementHandler(parser,
                          xmlStartElementHandler,
                          xmlEndElementHandler);

    mErrCode = 0;
    mCurrentFactoryP = NULL;
    mPort = kMALDefaultPort;
    mInterface = NULL;


    char buf[kFileBufSize];
    int len;
    do {
        len = ACE_OS::read(infile, buf, kFileBufSize);
```

```
        if (len == -1)
        {
            ACE_ERROR ((LM_ERROR, "Error while reading config file: %s\n", fileName));
            mErrCode = -1;
            break;
        }
        else if(!XML_Parse(parser, buf, len, len == 0))
        {
            ACE_ERROR ((LM_ERROR, "Parse Error: %s:%d %s\n", fileName,
                                          XML_GetCurrentLineNumber(parser),

XML_ErrorString(XML_GetErrorCode(parser))));
            mErrCode = -1;
            break;
        }
    } while(len > 0);


    XML_ParserFree(parser);
    ACE_OS::close (infile);

    return mErrCode;
}

void
MALConfig::xmlStartElementHandler(void *userData,
                                  const char *name,
                                  const char **atts)
{
    MALConfig *configP = (MALConfig*) userData;

    // server tag
    if (ACE_OS::strcmp(name, "malserver") == 0)
    {
        for (const char **attP=atts; *attP!=0; attP++)
        {
            const char *attName = *attP;
            const char *attValue = *(++attP);

            if (strcmp(attName, "port") == 0)
            {
                configP->mPort = ACE_OS::atoi(attValue);
            }
            else if (strcmp(attName, "interface") == 0)
            {
                configP->mInterface = BLUtils::strdup(attValue);
            }
            else
            {
                configP->unknownOption(attName);
            }
        }
    }
    // conduit tag
    else if (strcmp(name, "conduit") == 0)
    {
        const char *name = NULL;

        for (const char **attP=atts; *attP!=0; attP++)
        {
            const char *attName = *attP;
            const char *attValue = *(++attP);

            if (strcmp(attName, "name") == 0)
            {
                name = attValue;
            }
            else
            {
                configP->unknownOption(attName);
            }
        }

        if (name != NULL)
        {
```

```
        configP->mCurrentFactoryP = configP->mConduitManagerP->activateFactory(name);

        if (configP->mCurrentFactoryP == NULL)
        {
            ACE_ERROR ((LM_ERROR, "Error: Could not activate Conduit: %s\n", name));
            configP->mErrCode = -1;
        }
    }
  }
  // option tag
  else if (strcmp(name, "option") == 0)
  {
      const char *name = NULL;
      const char *value = NULL;

      for (const char **attP=atts; *attP!=0; attP++)
      {
          const char *attName = *attP;
          const char *attValue = *(++attP);

          if (strcmp(attName, "name") == 0)
          {
              name = attValue;
          }
          else if (strcmp(attName, "value") == 0)
          {
              value = attValue;
          }
          else
          {
              configP->unknownOption(attName);
          }
      }

      if (name != NULL && value != NULL && configP->mCurrentFactoryP != NULL)
      {
          if (configP->mCurrentFactoryP->setOption(name, value) != 0)
          {
              configP->unknownOption(name);
          }
      }
  }
}


void
MALConfig::xmlEndElementHandler(void *userData,
                                const char *name)
{
    MALConfig *configP = (MALConfig*) userData;

    // should probably try to validate a little more here
}

void
MALConfig::unknownOption(const char *option)
{
    ACE_ERROR ((LM_ERROR, "Error: Unknown Configuration Option: %s\n", option));
    mErrCode = -1;
}// MALIO.cpp

#include "MALIO.h"

void
MALIO::init(ACE_SOCK_Stream *streamP, AGReader *readerP, AGWriter *writerP)
{
    AGReaderInit(readerP, streamP, MALIO::read);
    AGWriterInit(writerP, streamP, MALIO::write);
}

int
MALIO::read(void *data, void *dst, int len)
{
    ACE_SOCK_Stream *streamP = (ACE_SOCK_Stream*) data;
```

```
    int readLen = streamP->recv_n((char*)dst, len);
    return readLen;
}

int
MALIO::write(void *data, void *buf, int len)
{
    ACE_SOCK_Stream *streamP = (ACE_SOCK_Stream*) data;

    int writeLen = streamP->send_n((char*)buf, len);

    return writeLen;
}// MALSession.cpp

#include "MALSession.h"
#include "MALIO.h"
#include "MALConduitManager.h"
#include "MALConduit.h"
#include "MALConstants.h"
#include "AGProtocol.h"
#include "AGDigest.h"

MALSession::MALSession()
{
    mDispatcherP = MALConduitManager::instance()->makeDispatcher();
    mConduitP = NULL;
    mIsInitialSession = true;
}

MALSession::~MALSession()
{
    delete mDispatcherP;

    // take care of this here so other clients of BLClientInfo don't have to use malloc and
free
    free(mClientInfo.getUsername());
    free(mClientInfo.getOSName());
    free(mClientInfo.getOSVersion());
    free(mClientInfo.getSerialNumber());
    free(mClientInfo.getLanguage());
    free(mClientInfo.getCharset());
}


int
MALSession::doSession(ACE_SOCK_Stream *streamP)
{
    MALIO::init(streamP, &mReader, &mWriter);

    if (readHeader() != 0)
        return -1;

    if (readCommands() != 0)
        return -1;

    // write http header
    char* status = "HTTP/1.0 200 OK\r\n\r\n";
    int len = ACE_OS::strlen(status);
    if (streamP->send_n(status, len) != len)
            return -1;

    int err = sendResponse();
    return err;
}

int
MALSession::readHeader()
{
    uint16 magic;

    AGReadMAGIC(&mReader, &magic);
    AGReadMAJORVERSION(&mReader, &mMajorVersion);
    AGReadMINORVERSION(&mReader, &mMinorVersion);

    if (magic != ((AG_PROTOCOL_MAGIC_HIGH << 8) | (AG_PROTOCOL_MAGIC_LOW)))
```

```
        ACE_ERROR_RETURN ((LM_ERROR,
                          "%n: ERROR wrong magic %d != %d\n",
                               magic,
                               ((AG_PROTOCOL_MAGIC_HIGH << 8) | (AG_PROTOCOL_MAGIC_LOW))),
                               -1);

    if (mMajorVersion != AG_PROTOCOL_MAJOR_VERSION)
        ACE_ERROR_RETURN ((LM_ERROR,
                          "%n: ERROR wrong major version client talking %d != server talking
%d\n",
                               mMajorVersion,
                               AG_PROTOCOL_MAJOR_VERSION),
                               -1);

    if (mMinorVersion != AG_PROTOCOL_MINOR_VERSION)
        ACE_ERROR ((LM_ERROR,
                   ("%n: ERROR wrong minor version client talking %d != server talking %d\n",
                    mMinorVersion,
                    AG_PROTOCOL_MINOR_VERSION)));

    return 0;
}

int
MALSession::readCommands()
{
    int err = 0;
    int count = 0;
    bool done = false;

    do {
        int32 command = AGReadCompactInt(&mReader);
        int32 len = AGReadCompactInt(&mReader);

        switch(command) {
        case AG_END_CMD:
            AGReadEND(&mReader);
            done = TRUE;
            break;
        case AG_EXPANSION_CMD:
            err = readExpansionCmd(len);
            break;
        case AG_HELLO_CMD:
                err = readHelloCmd();
            break;
        case AG_DEVICEINFO_CMD:
            err = readDeviceInfoCmd();
            break;
        case AG_OPENDATABASE_CMD:
            err = readOpenDatabaseCmd();
            break;
        case AG_CLOSEDATABASE_CMD:
            err = readCloseDatabaseCmd();
            break;
        case AG_RECORD_CMD:
            err = readRecordCmd();
            break;
        case AG_UNKNOWNDATABASE_CMD:
            err = readUnknownDatabaseCmd();
            break;
        case AG_NEWIDS_CMD:
            err = readNewIdsCmd();
            break;
        case AG_PING_CMD:
            err = readPingCmd();
            break;
        case AG_XMLDATA_CMD:
            err = readXMLDataCmd();
            break;
        default:
            ACE_ERROR_RETURN ((LM_ERROR,
                              "%n: ERROR unknown command %d\n",
                               command),
                               -1);

            break;
```

```
        }
        if (err == -1 || count >= kMALMaxCommands)
        {
            AGWriteGOODBYE(&mWriter, AG_DONE_STATUS, 1, "Error Processing Request");
            AGWriteEND(&mWriter);

            ACE_ERROR_RETURN ((LM_ERROR,
                              "%n: ERROR handling command %s\n",
                               AGProtocolCommandName((AGCommand)command)),
                               -1);
        }

        count++;
    } while (!done);

    return 0;
}

int
MALSession::sendResponse()
{
    // write header
    AGWriteMAGIC(&mWriter);
    AGWriteMAJORVERSION(&mWriter, AG_PROTOCOL_MAJOR_VERSION);
    AGWriteMINORVERSION(&mWriter, AG_PROTOCOL_MINOR_VERSION);

    MALWriter writer(&mWriter);

    if (mIsInitialSession)
    {
        mDispatcherP->sendInitialResponses(&writer, &mClientInfo);

        // clean this up
        time_t now = ACE_OS::time();
        char timeStr[64];
        (void) ACE_OS::ctime_r(&now, timeStr, sizeof(timeStr));

        AGWriteCOOKIE(&mWriter, ACE_OS::strlen(timeStr) + 1, timeStr);
        AGWriteSENDDEVICEINFO(&mWriter, true);
        AGWriteGOODBYE(&mWriter, AG_CALLAGAIN_STATUS, 0, NULL);
    }
    else
    {
        mDispatcherP->sendNormalResponses(&writer, &mClientInfo);

        AGWriteGOODBYE(&mWriter, AG_DONE_STATUS, 0, NULL);
    }

    AGWriteEND(&mWriter);
    return 0;
}

int
MALSession::readExpansionCmd(int len)
{
    int32 command;
    int32 commandLen;
    void *buf = NULL;

    AGReadEXPANSION(&mReader, &command, &commandLen, &buf);
    if(buf)
        free(buf);

    return 0;
}

int
MALSession::readHelloCmd()
{
    char *username;
    void *userCookie;
    uint8 digestAuth[16], nonce[16];
    int32 availableBytes, cookieLength;
    uint32 uid;
```

```
    AGDigestSetToNull(digestAuth);
    AGDigestSetToNull(nonce);

    if (mMajorVersion == 0 && mMinorVersion == 0)
    {
        AGReadHELLO(&mReader, &username, digestAuth, nonce, &availableBytes,
                    &cookieLength, &userCookie);
    }
    else
    {
        AGReadHELLO2(&mReader, &username, digestAuth, nonce, &availableBytes,
                     &cookieLength, &userCookie, &uid);
    }

    // authenticate here

    mClientInfo.setUsername(username);
    mClientInfo.setAvailableBytes(availableBytes);

    if (cookieLength == 0)
    {
        mIsInitialSession = true;
    }
    else
    {
        mIsInitialSession = false;
        // read date out of cookie
        free(userCookie);
    }

    return 0;
}

int
MALSession::readDeviceInfoCmd()
{
    char *osName, *osVersion, *serialNumber, *language, *charset;
    int32 colorDepth, screenWidth, screenHeight, platformDataLength;
    void *platformData;

    AGReadDEVICEINFO(&mReader, &osName, &osVersion,
                     &colorDepth, &screenWidth, &screenHeight,
                     &serialNumber, &language, &charset,
                     &platformDataLength, &platformData);

    mClientInfo.setOSName(osName);
    mClientInfo.setOSVersion(osVersion);
    mClientInfo.setSerialNumber(serialNumber);
    mClientInfo.setLanguage(language);
    mClientInfo.setCharset(charset);

    free(platformData);

    return 0;
}

int
MALSession::readOpenDatabaseCmd()
{
    char *dbname;

    AGReadOPENDATABASE(&mReader, &dbname);

    mConduitP = mDispatcherP->getConduitForDatabase(dbname);
    if (mConduitP != NULL)
        mConduitP->openDatabase(dbname);

    free(dbname);
    return 0;
}

int
MALSession::readCloseDatabaseCmd()
{
```

```
    if (mConduitP != NULL)
        mConduitP->closeDatabase();
    mConduitP = NULL;
    return 0;
}

int
MALSession::readRecordCmd()
{
    int32 uid;
    AGRecordStatus mod;
    int32 recordDataLength;
    void *recordData;
    int32 platformDataLength;
    void *platformData;

    AGReadRECORD(&mReader, &uid, &mod,
                 &recordDataLength, &recordData,
                 &platformDataLength, &platformData);

    if (mConduitP != NULL)
    {
        mConduitP->record(uid, mod,
                          recordDataLength, recordData,
                          platformDataLength, platformData);
    }

    free(recordData);
    free(platformData);

    return 0;
}

int
MALSession::readUnknownDatabaseCmd()
{
    char *dbname;

    AGReadUNKNOWNDATABASE(&mReader, &dbname);

    MALConduit *conduitP = mDispatcherP->getConduitForDatabase(dbname);
    if (conduitP != NULL)
        conduitP->unknownDatabase(dbname);

    free(dbname);
    return 0;
}

int
MALSession::readNewIdsCmd()
{
    AGArray *newids = NULL;
    int32 count;

    AGReadNEWIDS(&mReader, &newids);
    if(newids != NULL)
    {
        count = AGArrayCount(newids);

        if(count < 1 || count % 2 > 0)
        {
            AGArrayFree(newids);
            return -1;
        }
        else if (mConduitP != NULL)
        {
            MALIDs ids(newids);
            mConduitP->newIDs(&ids);
        }
        AGArrayFree(newids);
    }

    return 0;
}
```

```
int
MALSession::readPingCmd()
{
    AGReadPING(&mReader);

    return 0;
}

int
MALSession::readXMLDataCmd()
{
    int32 xmlLen = 0;
    void *xmlData = NULL;

    AGReadXMLDATA(&mReader, &xmlLen, &xmlData);

    if(xmlData != NULL)
    {
     free(xmlData);
    }

    return 0;
}
// BLClientInfoManager.cpp

#include "BLClientInfoManager.h"
#include "ace/OS.h"


BLClientInfoManager* BLClientInfoManager::sInstanceP = NULL;


BLClientInfoManager*
BLClientInfoManager::instance()
{
    if (sInstanceP == NULL)
        sInstanceP = new BLClientInfoManager();

    return sInstanceP;
}

BLClientInfoManager::BLClientInfoManager()
: mDefaultInfoP(NULL)
{
}

BLClientInfoManager::~BLClientInfoManager()
{
}

void
BLClientInfoManager::initialize()
{
    BLClientInfo *infoP = new BLClientInfo();
    infoP->setLanguage("en-us");
    infoP->setCharset("ISO-8859-1");
    infoP->setOSName("Palm OS");
    infoP->setOSVersion("3.0");
    infoP->setScreenWidth(160);
    infoP->setScreenHeight(160);
    infoP->setBitDepth(2);
    infoP->setAcceptType(BLTransformManager::kWMLCType);
    infoP->setAcceptType(BLTransformManager::kPalmBMPType);
    infoP->setUserAgent("UPG1 UP/4.0 (compatible; BLServer 1.0)");
    infoP->setAcceptString("text/x-wap.wml, text/vnd.wap.wml, image/vnd.wap.wbmp, */*");

    InfoPair pair;
    pair.first = "Blazer";
    pair.second = infoP;
    mInfoVector.push_back(pair);
    pair.first = "Elaine";
    mInfoVector.push_back(pair);
```

```
    infoP = new BLClientInfo();
    infoP->setLanguage("en-us");
    infoP->setCharset("ISO-8859-1");
    infoP->setOSName("Windows");
    infoP->setOSVersion("95");
    infoP->setScreenWidth(160);
    infoP->setScreenHeight(160);
    infoP->setBitDepth(4);
    infoP->setAcceptType(BLTransformManager::kHTMLType);
    infoP->setAcceptType(BLTransformManager::kGIFType);
    infoP->setUserAgent("Mozilla/4.0 (compatible; BLServer 1.0)");
    infoP->setAcceptString("*/*");

    pair.first = "Mozilla";
    pair.second = infoP;
    mInfoVector.push_back(pair);

    infoP = new BLClientInfo();
    infoP->setLanguage("en-us");
    infoP->setCharset("ISO-8859-1");
    infoP->setOSName("Palm OS");
    infoP->setOSVersion("3.0");
    infoP->setScreenWidth(160);
    infoP->setScreenHeight(160);
    infoP->setBitDepth(2);
    infoP->setUserAgent("UPG1 UP/4.0 (compatible; BLServer 1.0)");
    infoP->setAcceptString("text/x-wap.wml, text/vnd.wap.wml, image/vnd.wap.wbmp, */*");
    infoP->setAcceptType(BLTransformManager::kWMLType);
    infoP->setAcceptType(BLTransformManager::kPalmBMPType);
    mDefaultInfoP = infoP;
}

void
BLClientInfoManager::finalize()
{
    // cleanup
}

BLClientInfo*
BLClientInfoManager::getUserAgentInfo(const char *uaString)
{
    if (uaString != NULL)
    {
        for (std::vector<InfoPair>::iterator i = mInfoVector.begin();
             i != mInfoVector.end();
             i++)
        {
            const char *cp = i->first;
            const char *up = uaString;
            while (true)
            {
                if (*cp == '\0') // match
                    return i->second;
                if (*up == '\0')
                    break;
                if (*cp != *up)
                    break;
                cp++;
                up++;
            }
        }
    }
    return mDefaultInfoP;
}
// BLLog.cpp

#include "BLLog.h"
#include "ace/Log_Msg.h"

BLAccessLog* BLAccessLog::sInstanceP = NULL;
BLErrorLog* BLErrorLog::sInstanceP = NULL;

int
BLErrorLog::initialize()
{
```

```
    ACE_NEW_RETURN(sInstanceP,
                   BLErrorLog(),
                   -1);

    if (!sInstanceP->mFile.is_open())
    {
        delete sInstanceP;
        sInstanceP = NULL;

        ACE_ERROR_RETURN((LM_ERROR, "%p: Could not open error log for writing."), -1);
    }

    return 0;
}

int
BLAccessLog::initialize()
{
    ACE_NEW_RETURN(sInstanceP,
                   BLAccessLog(),
                   -1);

    if (!sInstanceP->mFile.is_open())
    {
        delete sInstanceP;
        sInstanceP = NULL;

        ACE_ERROR_RETURN((LM_ERROR, "%p: Could not open access log for writing."), -1);
    }

    return 0;
}

void
BLErrorLog::finalize()
{
    delete sInstanceP;
    sInstanceP = NULL;
}

void
BLAccessLog::finalize()
{
    delete sInstanceP;
    sInstanceP = NULL;
}

BLErrorLog::BLErrorLog()
: BLLog("error_log")
{
}

BLAccessLog::BLAccessLog()
: BLLog("access_log")
{
}

BLLog::BLLog(const char* path)
: mFile(path, std::ios::app)
{
}
// BLHttpAcceptor.cpp

#define ACE_BUILD_SVC_DLL

#include "BLHttpAcceptor.h"
#include "MALConduitManager.h"
#include "BLTransformManager.h"
#include "BLTransportManager.h"
#include "BLClientInfoManager.h"
#include "MALConfig.h"
#include "MALConstants.h"
#include "BLLog.h"

#include "ace/Get_Opt.h"
```

```
int
BLHttpAcceptor::init (int argc, char *argv[])
{
    int err;
    // parse arguments
    if (parseArgs(argc, argv) != 0)
        return -1;

    // Initialize MAL stuff
    MALConfig config;
    if (config.readConfigFile(mConfigFilename) < 0)
        return -1;

    if (BLAccessLog::initialize() < 0 ||
        BLErrorLog::initialize() < 0)
        return -1;

    MALConduitManager::instance()->initialize();

    // and proxy stuff
    BLTransportManager::instance()->initialize();
    if (BLTransformManager::instance()->initialize() < 0)
    {
        return -1;
    }
    BLClientInfoManager::instance()->initialize();

    // initialize acceptor
    service_port_ = config.getPort();
    if (config.getInterface() != NULL)
        err = service_addr_.set (config.getPort(), config.getInterface());
    else
        err = service_addr_.set (config.getPort());

    if (err < 0)
        return -1;

    if (open (service_addr_,
              ACE_Reactor::instance (),
              0, 0, 0,
              &mScheduleStrategy,
              "MAL Server",
              "MAL service") == -1)
    ACE_ERROR_RETURN ((LM_ERROR,
                       "%n: %p on port %d\n",
                       "acceptor::open failed",
                       service_addr_.get_port_number (),
                       -1);

    BLErrorLog::write("Server Started");

    return 0;
}

// This method is automatically called when the server is shutdown.

int

BLHttpAcceptor::fini (void)
{
  // Cleanup
    BLErrorLog::write("Server Shutting Down");

    MALConduitManager::instance()->finalize();
    BLTransportManager::instance()->finalize();
    BLTransformManager::instance()->finalize();
    BLClientInfoManager::instance()->finalize();
    BLAccessLog::finalize();
    BLErrorLog::finalize();

    return 0;
}

int
```

```
BLHttpAcceptor::parseArgs (int argc, char *argv[])
{
  this->mConfigFilename = kMALDefaultFilename;

  ACE_Get_Opt get_opt (argc, argv, "f:", 0);

  for (int c; (c = get_opt ()) != -1; )
    {
      switch (c)
        {
        case 'f':
          this->mConfigFilename = get_opt.optarg;
          break;
        default:
          ACE_ERROR_RETURN ((LM_ERROR,
                             "%n:\n[-f config-file]\n%a", 1),
                            -1);
        }
    }

  return 0;
}

int
BLHttpAcceptor::make_svc_handler (BLHttpHandler *&handler)
{
  ACE_NEW_RETURN (handler,
                  BLHttpHandler,
                  -1);
  return 0;
}


// The following is a "Factory" used by the ACE_Service_Config and
// svc.conf file to dynamically initialize the state of the server.

ACE_SVC_FACTORY_DEFINE (BLHttpAcceptor)
// BLHttpBase.cpp

#include "BLHttpBase.h"
#include "BLTransportStream.h"
#include "BLUtils.h"

#define kLineBufSize 2048
#define kBufSize 2048

BLHttpBase::BLHttpBase()
: mContentType(BLTransformManager::kUnknownType),
  mContentLength(-1),
  mMajorVersion(0),
  mMinorVersion(0),
  mChunkedEncoding(false)
{
}

void
BLHttpBase::init(ACE_SOCK_Stream *streamP, ACE_Time_Value *timeoutP)
{
    mStreamP = streamP;
    timeval t = timeoutP->operator timeval();
    mTimeout.set(t);
}

int
BLHttpBase::readMessage(BLTransportStream *transportP)
{
    int err;

    // check for chunked-encoding first since some broken
    // servers set content length and chunked-encoding
    if (mChunkedEncoding)
    {
        transportP->init(BLTransportStream::kUnknownLength, mContentType);
        err = readChunkedEncoding(transportP);
    }
```

```
    else if(mContentLength > 0)
    {
        transportP->init(mContentLength, mContentType);
        err = readChunk(mContentLength, transportP);
    }
    else
    {
        transportP->init(BLTransportStream::kUnknownLength, mContentType);
        err = readFull(transportP);
    }

    char c = 0;
    transportP->put(&c, 0, true);

    return err;
}

int
BLHttpBase::readChunk(int length, BLTransportStream *transportP)
{
    char buf[kBufSize];

    while (true)
    {
        int numRead = mStreamP->recv(&buf, BLUtils::min(length, kBufSize), &mTimeout);
        if (numRead <= 0)
            return -1;

        if (transportP->put(buf, numRead, false) < 0)
            return -1;

        length -= numRead;
        if (length == 0)
            break;
    }
    return 0;
}

int
BLHttpBase::readChunkedEncoding(BLTransportStream *transportP)
{
    char buf[kLineBufSize];

    while (true)
    {
        if (readline(buf, kLineBufSize) < 0)
            return -1;
        int chunkSize = ACE_OS::strtol(buf, NULL, 16);
        if (chunkSize < 0)
            return -1;
        if (chunkSize == 0)
            break;
        if (readChunk(chunkSize, transportP) < 0)
            return -1;
        if (readline(buf, kLineBufSize) < 0)
            return -1;
    }

    // skip entity headers (if any)
    do {
        if (readline(buf, kBufSize) < 0)
            return -1;
    } while (buf[0] != '\0');

    return 0;
}

int
BLHttpBase::readFull(BLTransportStream *transportP)
{
    char buf[kBufSize];

    int numRead;
    while (true)
    {
```

```
        numRead = mStreamP->recv(&buf, kBufSize, &mTimeout);
        if (numRead < 0)
            return -1;
        if (numRead == 0)
            break;

        if (transportP->put(buf, numRead, false) < 0)
            return -1;
    }

    return 0;
}

int
BLHttpBase::sendHeader(const char* header, const char* value)
{
    char buf[kBufSize];
    ACE_OS::sprintf(buf, "%s: %s\r\n", header, value);

    return mStreamP->send_n(buf, ACE_OS::strlen(buf), &mTimeout);
}

int
BLHttpBase::sendHeader(const char* header, int value)
{
    char buf[kBufSize];
    ACE_OS::sprintf(buf, "%s: %d\r\n", header, value);

    return mStreamP->send_n(buf, ACE_OS::strlen(buf), &mTimeout);
}

int
BLHttpBase::sendHeaders(BLHttpRequestInfo *infoP)
{
    if (infoP == NULL)
        return 0;

    BLHttpRequestInfo::HeaderVector *headers = infoP->getHeaders();

    for (BLHttpRequestInfo::HeaderVector::iterator i = headers->begin();
         i != headers->end();
         i++)
    {
        if (sendHeader(i->first, i->second) < 0)
            return -1;
    }
    return 0;
}

int
BLHttpBase::parseHeaders()
{
    char buf[kLineBufSize];

    while (true)
    {
        if (readline(buf, kLineBufSize) == -1)
            return -1;

        if (buf[0] == '\0')
            break;

        char *cp = ACE_OS::strchr(buf, ':');
        if (cp == NULL)
            return -1;
        *cp = '\0';

        while (*(++cp) == ' ') ; // skip spaces

        if (ACE_OS::strcasecmp(buf, "content-type") == 0)
        {
            mContentType = BLTransformManager::instance()->stringToContentType(cp);
        }
        else if (ACE_OS::strcasecmp(buf, "content-length") == 0)
        {
```

```
            mContentLength = ACE_OS::atoi(cp);
        }
        else if (ACE_OS::strcasecmp(buf, "transfer-encoding") == 0)
        {
            if (ACE_OS::strncmp(cp, "chunked", sizeof("chunked") - 1) == 0)
                mChunkedEncoding = true;
        }
        else if (handleHeader(buf, cp) < 0)
            return -1;
    }

    return 0;
}

int
BLHttpBase::readline(char *buf, int size)
{
    char c = 0;
    int rc = 0;
    int i;

    for (i=0; i<size-1; i++)
    {
        if ((rc = mStreamP->recv_n(&c, 1, 0, &mTimeout)) == 1)
        {
            if (c == '\n')
                break;
            if (c == '\r') {
                i--;
                continue;
            }

            buf[i] = c;
        }
        else
            return -1;
    }

    buf[i] = '\0';
    return 0;
}

int
BLHttpBase::sendString(const char* str)
{
    int len = ACE_OS::strlen(str);
    if (mStreamP->send_n(str, len) != len)
        return -1;

    return 0;
}
// BLHttpHandler.cpp

#include "BLHttpHandler.h"
#include "BLProxySession.h"
#include "MALSession.h"
#include "BLLog.h"

#define kLineBufSize 512
#define kHTTPBufSize 2048
#define kMaxRequestsPerSession 50
#define kHttpTimeout 3 * 60

BLHttpHandler::BLHttpHandler(ACE_Thread_Manager*)
: mUserAgent(NULL),
  mType(kGetType)
{
}

BLHttpHandler::~BLHttpHandler()
{
    delete[] mUserAgent;
}

int
```

```
BLHttpHandler::open (void *)
{
    // Shut off non-blocking IO if it was enabled...
    if (this->peer ().disable (ACE_NONBLOCK) == -1)
        ACE_ERROR_RETURN ((LM_ERROR,
                          "%p\n",
                          "disable"),
                         -1);

    // Spawn a new thread of control to handle the
    // client using a thread-per-connection concurrency model.  Note
    // that this implicitly uses the <ACE_Thread_Manager::instance> to
    // control all the threads.
    if (this->activate (THR_BOUND | THR_DETACHED) == -1)
        ACE_ERROR_RETURN ((LM_ERROR,
                          "%p\n",
                          "spawn"),
                         -1);

  return 0;
}

int
BLHttpHandler::svc()
{
    char pathBuf[kHTTPBufSize];
    int numRequests = kMaxRequestsPerSession;

    ACE_Time_Value timeout(kHttpTimeout);
    BLHttpBase::init(&peer(), &timeout);

    do {
        mRequestInfo.clear();

        if (readRequestLine(pathBuf, kHTTPBufSize) < 0)
            return -1;

        if (mMajorVersion < 1 || (mMajorVersion == 1 && mMinorVersion < 1))
            numRequests = 1;

        if (mType == kPostType &&
            mContentLength > 0 &&
            mContentType != BLTransformManager::kUnknownType)
        {
            mRequestInfo.setPostData(this);
        }

        if (parseHeaders() < 0)
            return -1;

        if (mContentType != BLTransformManager::kUnknownType)
            mRequestInfo.setHeader("Content-Type",
BLTransformManager::instance()->contentTypeToString(mContentType));

        BLAccessLog::write(mUserAgent, mStreamP, pathBuf);

        int err;
        if (ACE_OS::strcmp(pathBuf, "/sync") == 0)
        {
            if (mType != kPostType)
                return -1;
            MALSession malSession;
            err = malSession.doSession(mStreamP);
        }
        else
        {
            BLProxySession proxySession;
            err = proxySession.doSession(pathBuf, this, mStreamP);
        }
        if (err < 0)
            return -1;

    } while (--numRequests > 0);
```

```
    return 0;
}

int
BLHttpHandler::readRequestLine(char *pathBuffer,
                                      int bufferSize)
{
    char buf[kHTTPBufSize];

    do {
        if (readline(buf, kHTTPBufSize) < 0)
            return -1;
    } while (buf[0] == '\0');

    char *cp = buf;

    // Request Type
    if (ACE_OS::strncmp(buf, "POST", sizeof("POST") - 1) == 0)
    {
        mType = kPostType;
        cp += sizeof("POST") - 1;
    }
    else if (ACE_OS::strncmp(buf, "GET", sizeof("GET") - 1) == 0)
    {
        mType = kGetType;
        cp += sizeof("GET") - 1;
    }
    else
        return -1;

    // skip whitespace
    while (*cp == ' ' || *cp == '\t')
    {
        if (*cp == '\0')
            return -1;
        cp++;
    }

    // Path
    int i = 0;
    while (*cp != ' ' && *cp != '\t' && i < bufferSize - 1)
    {
        if (*cp == '\0')
            return -1;
        pathBuffer[i++] = *cp++;
    }
    pathBuffer[i] = '\0';

    // skip whitespace
    while (*cp == ' ' || *cp == '\t')
    {
        if (*cp == '\0')
            return -1;
        cp++;
    }

    // HTTP
    if (ACE_OS::strncmp(cp, "HTTP/", sizeof("HTTP/") - 1) != 0)
        return -1;
    cp += sizeof("HTTP/") - 1;

    // version
    mMajorVersion = ACE_OS::strtol(cp, &cp, 10);
    if (cp == NULL || *cp != '.')
        return -1;
    mMinorVersion = ACE_OS::strtol(cp + 1, &cp, 10);
    if (cp == NULL)
        return -1;

    return 0;
}

int
BLHttpHandler::handleHeader(const char* name, const char* value)
{
```

```
    if (ACE_OS::strcasecmp(name, "user-agent") == 0)
    {
        if (mUserAgent != NULL)
            delete mUserAgent;

        mUserAgent = BLUtils::strdup(value);
    }
    else if (ACE_OS::strcasecmp(name, "content-encoding") == 0 ||
             ACE_OS::strcasecmp(name, "cookie") == 0)
    {
        mRequestInfo.setHeader(name, value);
    }

    return 0;
}

int
BLHttpHandler::feed(BLTransportStream *transportP)
{
    if (mContentLength == -1)
    {
        transportP->init(mContentLength, mContentType);
        return 0;
    }

    return readMessage(transportP);
}
// BLHttpRequest.cpp

#include "BLHttpRequest.h"
#include "BLTransportManager.h"
#include "BLClientInfo.h"
#include "ace/Auto_Ptr.h"

#ifdef ACE_WIN32
#include <strstrea.h>
#else
#include <strstream>
#endif // ACE_WIN32

#define kLineBufSize 2048
#define kBufSize 2048
#define kMaxRedirects 10

// don't call HTTPBase constructor because we do everything in init
BLHttpRequest::BLHttpRequest()
{
}

void
BLHttpRequest::init(ACE_SOCK_Stream *streamP)
{
    mContentType = BLTransformManager::kUnknownType;
    mMajorVersion = 0;
    mMinorVersion = 0;
    mProxyInfoP = NULL;
    mLocation  = NULL;
    mChunkedEncoding = false;
    mContentLength = -1;

    ACE_Time_Value timeout(ACE_DEFAULT_TIMEOUT);
    BLHttpBase::init(streamP, &timeout);
}

BLHttpRequest::~BLHttpRequest()
{
    if (mLocation != NULL)
        delete[] mLocation;

    if (mStreamP != NULL)
    {
        mStreamP->close();
        delete mStreamP;
    }
}
```

```
int
BLHttpRequest::requestFile(BLUrl *urlP, BLClientInfo *clientInfoP,  BLHttpRequestInfo
*infoP)
{
    if (mStreamP == NULL)
        return -1;

    char buf[kLineBufSize];
    const char *hostname = urlP->getHostname();
    const char *path = urlP->getPath();
    mProxyInfoP = infoP;
    BLTransportFeeder *postP = infoP == NULL ? NULL : infoP->getPostData();

    int commandsize =
     ACE_OS::strlen(path)
     + 20 // Extra
     + 1  // NUL byte
     + 16; // Protocol filler...

    if (commandsize > kLineBufSize)
        return -1;

    ACE_OS::sprintf (buf,
                     "%s %s HTTP/1.1\r\n",
                     postP == NULL ? "GET" : "POST",
                     path);

    // send headers
    if (sendString(buf) < 0 ||
        sendHeader("Accept-Charset", clientInfoP->getCharset()) < 0 ||
        sendHeader("Accept-Language", clientInfoP->getLanguage()) < 0 ||
        sendHeader("Accept", clientInfoP->getAcceptString()) < 0 ||
        sendHeader("User-Agent", clientInfoP->getUserAgent()) < 0 ||
        sendHeader("Host", hostname) < 0)
        return -1;

    if (infoP != NULL)
    {
        if (sendHeaders(infoP) < 0)
            return -1;
    }

    if (postP == NULL)
    {
        if (sendString("\r\n") < 0)
          return -1;
    }
    else
    {
        if (postP->feed(this) < 0)
            return -1;
    }

    int status = readStatusLine();
    if (parseHeaders() == -1)
        return -1;
    else
        return status;
}

int
BLHttpRequest::readFile(BLTransportStream *transportP)
{
    int err = readMessage(transportP);

    mStreamP->close();
    delete mStreamP;
    mStreamP = NULL;

    return err;
}

int
BLHttpRequest::readStatusLine()
```

```
{
    char linebuff[kLineBufSize];
    char tokbuff[kLineBufSize];

    int status = 0;

    if (readline(linebuff, kLineBufSize) == -1)
        return -1;
    istrstream is(linebuff);

    if (!is.getline(tokbuff, kLineBufSize, '/') ||
        !(ACE_OS::strcmp(tokbuff, "HTTP") == 0) ||
        !(is >> mMajorVersion) ||
         !(is.get() == '.')  ||
         !(is >> mMinorVersion) ||
         !(is >> status) ||
         !(is.getline(tokbuff, kLineBufSize)))
        return -1;

    return status;
}

int
BLHttpRequest::handleHeader(const char* name, const char* value)
{
    if (ACE_OS::strcasecmp(name, "location") == 0)
    {
        if (mLocation != NULL)
            delete[] mLocation;
        mLocation = BLUtils::strdup(value);
    }
    else if (ACE_OS::strcasecmp(name, "content-encoding") == 0)
    {
        mRequestInfo.setHeader(name, value);
    }
    else if (ACE_OS::strcasecmp(name, "set-cookie") == 0)
    {
        mRequestInfo.setHeader(name, value);

        if (mProxyInfoP != NULL)
            mProxyInfoP->setHeader("Cookie", value);
    }
    return 0;
}

int
BLHttpRequest::init(int length, BLTransformManager::ContentType type)
{
    if (sendHeader("Content-Length", length) < 0 ||
         sendHeader("Content-Type",
BLTransformManager::instance()->contentTypeToString(type)) < 0 ||
         sendString("\r\n") < 0)
        return -1;

    return 0;
}

int
BLHttpRequest::put(char *data,  int size,  bool final)
{
    if (size > 0 && mStreamP->send_n(data, size, &mTimeout) != size)
        return -1;

    return 0;
}

void
BLHttpRequestFactory::initialize(BLTransportManager *managerP)
{
    managerP->registerProtocolHandler(BLUrl::kHttpProtocol, this);
}

void
BLHttpRequestFactory::finalize()
{
```

```
}
const char*
BLHttpRequestFactory::getName()
{
    return "http";
}

BLTransportRequest*
BLHttpRequestFactory::requestFile(BLUrl *urlP, BLClientInfo *clientInfoP, BLHttpRequestInfo
*infoP)
{
    int numRedirects = 0;
    BLHttpRequest *requestP;
    ACE_NEW_RETURN(requestP,
                   BLHttpRequest(),
                   NULL);

    while (true)
    {
        ACE_SOCK_Stream *sockStreamP;
        ACE_NEW_RETURN(sockStreamP,
                       ACE_SOCK_Stream(),
                       NULL);

        requestP->init(sockStreamP);
        if (mConnector.connect(*sockStreamP, *urlP->getAddr()) == -1)
        {
            delete requestP;
            return NULL;
        }

        if (requestP->requestFile(urlP, clientInfoP, infoP) < 0)
        {
            delete requestP;
            return NULL;
        }
        if (requestP->getLocation() == NULL)
        {
            if (numRedirects > 0)
                requestP->getRequestInfo()->setHeader("Content-Location", urlP->toString());

            return requestP;
        }
        if (numRedirects >= kMaxRedirects)
        {
            delete requestP;
            return NULL;
        }

        // eat up the page
        BLNullTransportStream nullStream;
        requestP->readFile(&nullStream);

        if (BLUrl::isRelative(requestP->getLocation()))
        {
            if (urlP->setRelative(urlP, requestP->getLocation()) < 0)
            {
                delete requestP;
                return NULL;
            }
        }
        else
        {
            if (urlP->set(requestP->getLocation()) < 0)
            {
                delete requestP;
                return NULL;
            }
        }

        numRedirects++;
    }
}// BLProxySession.cpp
```

```
#include "BLProxySession.h"
#include "BLClientInfoManager.h"
#include "BLTransportStream.h"
#include "BLTransportManager.h"
#include "BLTransformation.h"
#include "BLHttpBase.h"
#include "ace/Auto_Ptr.h"

#define kMaxProtocolLength 10
#define kMaxUrlLength 1024
#define kErrorBufSize 2048

class ProxyStream : public BLTransportStream, public BLHttpBase
{
public:
    ProxyStream(ACE_SOCK_Stream *ios, BLHttpRequestInfo *infoP, bool chunked)
        : mWroteHeader(false),
          mType(BLTransformManager::kUnknownType),
          mInfoP(infoP),
          mChunked(chunked),
          mBad(true)
    {
        ACE_Time_Value t(ACE_DEFAULT_TIMEOUT);
        BLHttpBase::init(ios, &t);
    }

    virtual int init(int length, BLTransformManager::ContentType type);
    virtual int put(char *data,  int size,  bool final);

protected:

    int error()
    {
        mBad = true;
        return -1;
    }

    BLTransformManager::ContentType mType;
    BLHttpRequestInfo *mInfoP;
    bool mWroteHeader;
    bool mChunked;
    bool mBad;
    int mLength;
};

int
ProxyStream::init(int length, BLTransformManager::ContentType type)
{
    mLength = length;
    mType = type;
    mBad = false;

    if (sendString("HTTP/1.1 200 OK\r\n") < 0 ||
        sendHeader("Content-Type",
BLTransformManager::instance()->contentTypeToString(mType)) < 0||
        sendHeaders(mInfoP) < 0)
        return error();

    if (mLength != BLTransportStream::kUnknownLength)
    {
        if (sendHeader("Content-Length", length) < 0)
            return error();

        mChunked = false;
    }
    else if (mChunked)
    {
        if (sendHeader("Transfer-Encoding", "chunked") < 0)
            return error();
    }

    if (sendString("\r\n") < 0)
        return error();
```

```
    return 0;
}
int
ProxyStream::put(char *data,  int size,  bool final)
{
    if (mBad)
        return -1;

    if (mChunked) // chunked
    {
        if (size > 0)
        {
            char buf[32];
            ACE_OS::sprintf(buf, "%x\r\n", size);

            if (sendString(buf) < 0 ||
                mStreamP->send_n(data, size) != size ||
                sendString("\r\n") < 0)
               return error();
        }

        if (final)
        {
            if (sendString("0\r\n\r\n") < 0)
                return error();
        }
    }
    else // not chunked
    {
        if (size > 0)
        {
            if (mStreamP->send_n(data, size) != size)
                return error();
        }
    }

    return 0;
}

BLProxySession::BLProxySession()
{
}

int
BLProxySession::doSession(char *path, BLHttpHandler *handlerP, ACE_SOCK_Stream *ios)
{
    BLClientInfo *clientInfoP =
BLClientInfoManager::instance()->getUserAgentInfo(handlerP->getUserAgent());
    if (clientInfoP == NULL)
        return -1;

    BLUrl url;
    if (parsePath(path, &url) < 0)
        return error("Operation not permitted.", handlerP, clientInfoP, ios);

    BLTransportRequest *requestP = BLTransportManager::instance()->requestFile(&url,

clientInfoP,

handlerP->getRequestInfo());
    auto_ptr<BLTransportRequest> requestPtr(requestP);
    if (requestP == NULL)
        return error("Unable to connect to server.", handlerP, clientInfoP, ios);

    ProxyStream *outputP = getProxyStream(handlerP, ios, requestP->getRequestInfo());
    auto_ptr<BLTransportStream> outputPtr(outputP);
    if (outputP == NULL)
        return -1;

    BLTransformation *transformP =
        BLTransformManager::instance()->getTransformation(clientInfoP,

requestP->getContentType(),
                                                                  outputP);
```

```
    if (transformP == NULL)
        return error("Unsupported content type.", handlerP, clientInfoP, ios);
    auto_ptr<BLTransformation> transformPtr(transformP);

    if (requestP->readFile(transformP->getTransportStream()) < 0)
        return -1;

    return 0;
}

ProxyStream*
BLProxySession::getProxyStream(BLHttpHandler *handlerP, ACE_SOCK_Stream *ios,
BLHttpRequestInfo *infoP)
{
    bool chunked = handlerP->getMajorVersion() >= 1 && handlerP->getMinorVersion() >= 1;

    return new ProxyStream(ios, infoP, chunked);
}

int
BLProxySession::parsePath(char *path, BLUrl *urlP)
{
    if (BLUrl::isAbsolute(path))
    {
        if (urlP->set(path) < 0)
            return -1;
    }
    else
    {
        if (path[0] != '/')
            return -1;
        path++;

        // protocol
        char *cp = ACE_OS::strchr(path, '/');
        if (cp == NULL)
            return -1;
        *cp = '\0';
        BLUrl::ProtocolType protocol = BLUrl::stringToProtocolType(path);

        // port
        char *port = cp + 1;
        cp = ACE_OS::strchr(port, '/');
        if (cp == NULL)
            return -1;
        *cp = '\0';
        int portNum = ACE_OS::atoi(port);
        if (portNum <= 0)
            return -1;

        char *urlString = cp + 1;
        if (urlP->set(protocol, urlString))
            return -1;
        urlP->setPort(portNum);
    }
    return 0;
}

int
BLProxySession::error(char *error, BLHttpHandler *handlerP, BLClientInfo *clientInfoP,
ACE_SOCK_Stream *ios)
{
    char buf[kErrorBufSize];
    ACE_OS::sprintf(buf, "<b>Server Error:</b><br>%s", error);

    ProxyStream *outputP = getProxyStream(handlerP, ios, NULL);
    auto_ptr<BLTransportStream> outputPtr(outputP);
    if (outputP == NULL)
        return -1;

    BLTransformation *transformP =
        BLTransformManager::instance()->getTransformation(clientInfoP,

BLTransformManager::kHTMLType,
                                                                    outputP);
```

```
    if (transformP == NULL)
        return -1;
    auto_ptr<BLTransformation> transformPtr(transformP);

    if (transformP->getTransportStream()->put(buf, ACE_OS::strlen(buf), true) < 0)
        return -1;

    return 0;
}
// BLTransportDefs.cpp

#include "BLHttpRequest.h"
#include "BLTransportManager.h"

BLHttpRequestFactory httpRequestFactory;

BLTransportRequestFactory* BLTransportManager::sFactoryDefs[] =
{
    &httpRequestFactory,
    NULL
};
// BLTransportManager.cpp

#include "BLTransportManager.h"
#include "ace/OS.h"

BLTransportManager* BLTransportManager::sInstanceP = NULL;

BLTransportManager*
BLTransportManager::instance()
{
    if (sInstanceP == NULL)
        sInstanceP = new BLTransportManager();

    return sInstanceP;
}

BLTransportManager::BLTransportManager()
{
    ACE_OS::memset(mHandlerTable, 0, BLUrl::kNumProtocols *
sizeof(BLTransportRequestFactory*));
}

BLTransportManager::~BLTransportManager()
{
}

void
BLTransportManager::initialize()
{
    for (BLTransportRequestFactory** factoryP = sFactoryDefs;
         *factoryP != NULL;
         factoryP++)
    {
        (*factoryP)->initialize(this);
    }
}

void
BLTransportManager::finalize()
{
    for (BLTransportRequestFactory** factoryP = sFactoryDefs;
         *factoryP != NULL;
         factoryP++)
    {
        (*factoryP)->finalize();
    }
}

void
BLTransportManager::registerProtocolHandler(BLUrl::ProtocolType protocol,
BLTransportRequestFactory *factoryP)
{
    if (protocol >= 0 && protocol < BLUrl::kNumProtocols)
        mHandlerTable[protocol] = factoryP;
```

```
}

BLTransportRequestFactory*
BLTransportManager::getFactoryForProtocol(BLUrl::ProtocolType protocol)
{
    if (protocol >= 0 && protocol < BLUrl::kNumProtocols)
        return mHandlerTable[protocol];

    return NULL;
}

BLTransportRequest*
BLTransportManager::requestFile(BLUrl *urlP, BLClientInfo *clientInfoP, BLHttpRequestInfo
*infoP)
{
    BLTransportRequestFactory *factoryP = getFactoryForProtocol(urlP->getProtocol());
    if (factoryP == NULL)
        return NULL;

    return factoryP->requestFile(urlP, clientInfoP, infoP);
}
// BLTransportStream.cpp

#include "BLTransportStream.h"
#include "ace/OS.h"

#define kDefaultBufSize 1024 * 8

BLAccumulatingStream::BLAccumulatingStream()
:  mDataBufP(NULL),
  mCurrentDataSize(0),
  mTotalDataSize(-1)
{
}

BLAccumulatingStream::~BLAccumulatingStream()
{
    if (mDataBufP != NULL)
        delete[] mDataBufP;
}

int
BLAccumulatingStream::init(int length, BLTransformManager::ContentType type)
{
    if (length <= 0 || mDataBufP != NULL)
        return -1;

    mType = type;
    mTotalDataSize = length;
    ACE_NEW_RETURN(mDataBufP,
                   char[length],
                   -1);

    return 0;
}

int
BLAccumulatingStream::put(char *data,  int size,  bool final)
{
    if (mDataBufP == NULL)
    {
        mTotalDataSize = kDefaultBufSize;
        ACE_NEW_RETURN(mDataBufP,
                       char[kDefaultBufSize],
                       -1);
    }
    if (mCurrentDataSize + size > mTotalDataSize)
    {
        char *newBuf;
        int len;
        if (mCurrentDataSize + size < mTotalDataSize * 2)
            len = mTotalDataSize * 2;
        else
            len = mCurrentDataSize + size;
```

```
        ACE_NEW_RETURN(newBuf,
                       char[len],
                       -1);
        ACE_OS::memcpy(newBuf, mDataBufP, mCurrentDataSize);

        delete[] mDataBufP;
        mDataBufP = newBuf;
    }

    ACE_OS::memcpy(mDataBufP + mCurrentDataSize, data, size);
    mCurrentDataSize += size;

    if (final)
    {
        int err = putFinal(mDataBufP, mCurrentDataSize);
        delete[] mDataBufP;
        mDataBufP = NULL;

        return err;
    }

    return 0;
}
// BLTransportWriter.cpp

#include "BLTransportWriter.h"
#include "BLTransportStream.h"

BLTransportStreamBuf::BLTransportStreamBuf(BLTransportStream *streamP)
: mStreamP(streamP)
{
    setp(mBuf, mBuf + kStreamBufSize - 1);
}

BLTransportStreamBuf::~BLTransportStreamBuf()
{
    if (mStreamP != NULL)
        mStreamP->put(mBuf, pptr() - mBuf, true);
}

int
BLTransportStreamBuf::overflow(int c)
{
    if (mStreamP == NULL)
        return EOF;

    if (c != EOF)
        *pptr() = c;

    mStreamP->put(mBuf, pptr() - mBuf + 1, false);

    setp(mBuf, mBuf + kStreamBufSize - 1);
    return c;
}

int
BLTransportStreamBuf::sync()
{
    if (mStreamP == NULL)
        return EOF;

    if (pptr() - mBuf > 0)
    {
        mStreamP->put(mBuf, pptr() - mBuf, false);
        setp(mBuf, mBuf + kStreamBufSize - 1);
    }

    return 0;
}// BLUrl.cpp

#include "BLUrl.h"
#include "BLUtils.h"

#define kMaxPathLen 1024
```

```
BLUrl::ProtocolInfo BLUrl::sProtocolTable[kNumProtocols] = { {"http", 80} };

BLUrl::BLUrl()
: mProtocol(kUnknownProtocol),
  mHostname(NULL),
  mPath(NULL),
  mString(NULL)
{
}

BLUrl::~BLUrl()
{
    delete[] mHostname;
    delete[] mPath;
    delete[] mString;
}

void
BLUrl::clear()
{
    delete[] mHostname;
    delete[] mPath;
    delete[] mString;
    mHostname = NULL;
    mPath = NULL;
    mString = NULL;
}

int
BLUrl::set(ProtocolType protocol,
           char *hostName,
           char *path,
           int port)
{
    if (protocol < 0 || protocol >= kNumProtocols)
        return -1;

    // in case we are setting relative to self, we don't want to delete the old strings
until we make copies
    char *newHostname;
    char *newPath;
    ACE_ALLOCATOR_RETURN(newHostname,
                         BLUtils::strdup(hostName),
                         -1);
    ACE_ALLOCATOR_RETURN(newPath,
                         BLUtils::strdup(path),
                         -1);
    clear();
    mHostname = newHostname;
    mPath = newPath;
    mProtocol = protocol;

    mAddr.set(port, mHostname);

    return 0;
}

int
BLUrl::set(ProtocolType protocol,
           char *hostName,
           char *path)
{
    if (protocol < 0 || protocol >= kNumProtocols)
        return -1;

    set(protocol, hostName, path, sProtocolTable[protocol].defaultPort);
    return 0;
}

int
BLUrl::set(ProtocolType protocol, char *urlString)
{
    if (protocol < 0 || protocol >= kNumProtocols)
        return -1;
    clear();
```

```
    mProtocol = protocol;
    char *cp = ACE_OS::strchr(urlString, '/');
    if (cp != NULL)
    {
        ACE_NEW_RETURN(mHostname,
                       char[cp - urlString + 1],
                       -1);
        ACE_OS::strncpy(mHostname, urlString, cp - urlString);
        mHostname[cp - urlString] = '\0';

        ACE_ALLOCATOR_RETURN(mPath,
                             BLUtils::strdup(cp),
                             -1);
    }
    else
    {
        ACE_ALLOCATOR_RETURN(mHostname,
                             BLUtils::strdup(urlString),
                             -1);
        ACE_ALLOCATOR_RETURN(mPath,
                             BLUtils::strdup("/"),
                             -1);
    }

    int port;
    cp = ACE_OS::strchr(mHostname, ':');
    if (cp != NULL)
    {
        *cp = '\0';
        cp++;
        port = ACE_OS::atoi(cp);
    }
    else
    {
        port = sProtocolTable[protocol].defaultPort;
    }
    mAddr.set(port, mHostname);
    return 0;
}

int
BLUrl::set(char *urlString)
{
    char buf[kMaxPathLen];

    char *cp = ACE_OS::strstr(urlString, "://");
    if (cp == NULL)
        return -1;

    int len = BLUtils::min(kMaxPathLen, cp - urlString);
    ACE_OS::strncpy(buf, urlString, len);
    buf[len] = '\0';
    ProtocolType protocol = stringToProtocolType(buf);

    char *hostname = cp + 3;
    return set(protocol, hostname);
}

void
BLUrl::setPort(int port)
{
    mAddr.set_port_number(port);
}

int
BLUrl::setRelative(BLUrl *baseUrlP, char *path)
{
    if (path[0] = '/')
    {
        set(baseUrlP->mProtocol, baseUrlP->mHostname, path,
baseUrlP->mAddr.get_port_number());
    }
    else
```

```
    {
        char buf[kMaxPathLen];
        const char *basePath = baseUrlP->mPath;
        const char *endP = basePath + ACE_OS::strlen(basePath) - 1;

        // back up to last '/'
        while (*endP != '/' && endP >= basePath)
            endP--;

        while (path[0] == '.' && path[1] == '.')
        {
            if (path[2] == '/')
                path += 3;
            else if (path[2] == '\0')
                path += 2;
            else
                return -1;

            while (endP > basePath && *(--endP) != '/')
                ;
        }

        int len = BLUtils::min(kMaxPathLen, endP - basePath + 1);
        ACE_OS::strncpy(buf, basePath, len);
        buf[len] = '\0';
        ACE_OS::strncat(buf, path, kMaxPathLen - len);

        set(baseUrlP->mProtocol, baseUrlP->mHostname, buf,
baseUrlP->mAddr.get_port_number());
    }

    return 0;
}

char*
BLUrl::toString()
{
    if (mProtocol == kUnknownProtocol)
        return NULL;
    if (mString != NULL)
        return mString;

    int len = ACE_OS::strlen(sProtocolTable[mProtocol].string)
                + 3 // len ://
                + ACE_OS::strlen(mHostname)
                + ACE_OS::strlen(mPath)
                + sizeof(":65536");

    ACE_NEW_RETURN(mString,
                    char[len],
                    NULL);

    if (mAddr.get_port_number() == sProtocolTable[mProtocol].defaultPort)
    {
        ACE_OS::sprintf(mString, "%s://%s%s", sProtocolTable[mProtocol].string,
                                    mHostname,
                                    mPath);
    }
    else
    {
        ACE_OS::sprintf(mString, "%s://%s:%d%s", sProtocolTable[mProtocol].string,
                                    mHostname, mAddr.get_port_number(),
                                    mPath);
    }
    return mString;
}

bool
BLUrl::isRelative(char *urlString)
{
    for (int i=0; i<kNumProtocols; i++)
    {
        char *cp = sProtocolTable[i].string;
        char *up = urlString;
        while (true)
```

```
        {
            if (*cp == '\0') // match
                return ACE_OS::strncmp(up, "://", 3) != 0;
            if (*up == '\0')
                break;
            if (*cp != *up)
                break;
            cp++;
            up++;
        }
    }
    return true;
}

BLUrl::ProtocolType
BLUrl::stringToProtocolType(char *protocolString)
{
    for (int i=0; i<kNumProtocols; i++)
    {
        if (ACE_OS::strcasecmp(protocolString, sProtocolTable[i].string) == 0)
            return (ProtocolType)i;
    }
    return kUnknownProtocol;
}
#include "BLImageTransformer.h"
#include "BLClientInfo.h"

typedef unsigned short Word;
typedef unsigned char Byte;

#if (ACE_BYTE_ORDER == ACE_LITTLE_ENDIAN)
#define PALM_WORD(X) ((Word) ((((X) >> 8) & 0xFF) | (((X) << 8 ) & 0xFF00)))
#else
#define PALM_WORD(X) ((unsigned short) (X))
#endif

typedef struct {
    Word compressed:1;          // Data format:  0=raw; 1=compressed
    Word hasColorTable:1;   // if true, color table stored before bits[]
    Word reserved :14;
} BitmapFlagsType;

typedef struct {
    Word                    width;
    Word                    height;
    Word                    rowBytes;
    BitmapFlagsType     flags;
    Byte                        pixelSize;          // bits/pixel
    Byte                        version;                // version of bitmap. This is vers 1
    Word                        nextDepthOffset;    // # of DWords to next BitmapType
                                                        //  from beginnning of this one
    Word                        reserved [2];
} BitmapType;


BLImageTransformer::BLImageTransformer(BLTransformManager::ContentType fromType,
        BLTransformManager::ContentType toType)
: BLTransformation(fromType, toType),
    mImageP(NULL),
    mOutputH(0),
    mOutputV(0),
    mOutputIsColor(0),
    mOutputQuality(75)
{
    GetImageInfo(&mImageInfo);
}

int BLImageTransformer::init(BLTransportStream *outputTransportP,
                            BLImageTransformerFactory *parentFactoryP)
{
    mOutputTransportP = outputTransportP;
    mParentFactoryP = parentFactoryP;

    return 0;
}
```

```
BLImageTransformer::~BLImageTransformer()
{
    if (mImageP != NULL)
    {
        DestroyImage(mImageP);
    }
//  DestroyImageInfo(&mImageInfo);
}

BLTransportStream* BLImageTransformer::getTransportStream()
{
    return this;
}

void BLImageTransformer::setClientInfo(BLClientInfo *ciP)
{
    mClientInfoP = ciP;
}

int BLImageTransformer::readMem (const char *blobP, const size_t length)
{
    GetImageInfo(&mImageInfo);

    switch(mFromType)
    {
    case BLTransformManager::kJPEGType:
        strcpy(mImageInfo.filename, "image.jpg");
        break;
    case BLTransformManager::kGIFType:
        strcpy(mImageInfo.filename, "image.gif");
        break;
    case BLTransformManager::kPNGType:
        strcpy(mImageInfo.filename, "image.png");
        break;
    case BLTransformManager::kWBMPType:
        strcpy(mImageInfo.filename, "image.wbmp");
        break;
    }

    //SetImageInfo(&mImageInfo, 0);

    mImageP = BlobToImage(&mImageInfo, blobP, length);
    if (mImageP == NULL)
    {
        //logError("Could not read image");
        return -1;
    }

    if (mImageP->next != NULL)
    {
        mImageP->next->previous = NULL;
        DestroyImages(mImageP->next);
        mImageP->next = NULL;
    }

    return 0;
}

int BLImageTransformer::putFinal(char *data,  int size)
{
    if (readMem(data, size) < 0 || transformImage() < 0)
    {
        return -1;
    }
    return writeImage();
}

int
BLImageTransformer::transformImage()
{
    int clientH = mClientInfoP->getUsableScreenWidth();
    int clientV = mClientInfoP->getUsableScreenHeight();

    if (mImageP->columns > mImageP->rows)
```

```
    {
        if (mImageP->columns > clientH)
        {
            Image *newImage = ScaleImage(mImageP, clientH,
                mImageP->rows * clientH / mImageP->columns);

            if (newImage == NULL)
            {
                //logError("Out of memory when scaling");
                return -1;
            }

            DestroyImage(mImageP);

            mImageP = newImage;
        }
    }
    else
    {
        if (mImageP->rows > clientV)
        {
            Image *newImage = ScaleImage(mImageP, mImageP->columns * clientV / mImageP->rows,
                clientV);

            if (newImage == NULL)
            {
                //logError("Out of memory when scaling");
                return -1;
            }

            DestroyImage(mImageP);

            mImageP = newImage;
        }
    }

    // examine client info to determine screen bit depth

    // VERY rough new attempt

    //Image *mapImageP;

    QuantizeInfo qi;

    qi.tree_depth = 0;
    qi.dither = 0;
    qi.colorspace = GRAYColorspace;

    switch(mClientInfoP->getBitDepth())
    {
    case 4:
        qi.number_colors = 16;
        qi.measure_error = 0;
        QuantizeImage(&qi, mImageP);

        break;
    case 2:
    default:
        qi.number_colors = 4;
        qi.measure_error = 0;

        qi.dither = (GetNumberColors(mImageP, NULL) > 16);

        QuantizeImage(&qi, mImageP);

        break;
    }

    return 0;
}

int
BLImageTransformer::writeImage()
{
    //ImageInfo ii;
```

```
    //GetImageInfo(&ii);

    char *blob = NULL;
    size_t length = 1;
    int err = 0;

    switch(mToType)
    {
    case BLTransformManager::kGIFType:
        strcpy(mImageP->magick, "GIF");
        blob = (char *) ImageToBlob(&mImageInfo, mImageP, &length);
        if (blob == NULL)
        {
            //ERROR!  Don't write TODO : what to do?
            return - 1;
        }
        err = mOutputTransportP->init(length, BLTransformManager::kGIFType);
        if (err != -1)
        {
            err = mOutputTransportP->put(blob, length, true);
        }
        FreeMemory(blob);
        break;

    case BLTransformManager::kPalmBMPType:
        err = writePalmBitmap();
        break;
    }

    return err;

}

static int redcmp(const void *elem1, const void *elem2 )
{
    return ((PixelPacket*)elem1)->red - ((PixelPacket*)elem2)->red;
}

static int greencmp(const void *elem1, const void *elem2 )
{
    return ((PixelPacket*)elem1)->green - ((PixelPacket*)elem2)->green;
}

int
BLImageTransformer::writePalmBitmap()
{
    BitmapType bitmap;
    memset(&bitmap, 0, sizeof(BitmapType));

    int bitDepth = mClientInfoP->getBitDepth();
    int width = mImageP->columns;
    int height = mImageP->rows;
    int padding = 0;
    int rowbytes = mImageP->columns * bitDepth / 8;
    if ((mImageP->columns * bitDepth) % 8 != 0)
        rowbytes++;
    if (rowbytes % 4 != 0)
    {
        padding = 4 - (rowbytes % 4);
        rowbytes += padding; // word align rows
    }

    bitmap.width = PALM_WORD(width);
    bitmap.height = PALM_WORD(height);
    bitmap.rowBytes = PALM_WORD(rowbytes);
    bitmap.pixelSize = (Byte) bitDepth;
    bitmap.version = (Byte) 1;

    int datasize = rowbytes * height;

    if (mOutputTransportP->init(datasize + sizeof(bitmap), BLTransformManager::kPalmBMPType)
 < 0 ||
        mOutputTransportP->put((char*) &bitmap, sizeof(bitmap), false) < 0)
        return -1;
```

```
    char *dataP = new char[datasize];
    if (dataP == NULL)
        return -1;

    GetPixelCache(mImageP, 0, 0, mImageP->columns, mImageP->rows);
    IndexPacket * ip = mImageP->indexes;
    if (ip == NULL)
        return -1;

    PixelPacket *cmap = (PixelPacket *)malloc(4*sizeof(PixelPacket));

    memcpy(cmap, mImageP->colormap, 4*sizeof(PixelPacket));

    if (cmap == NULL)
        return -1;

    // green holds original index position in the map
    for (int u = 0; u < 4; u++)
    {
        cmap[u].green = u;
    }

    // sort according to gray (red) value
    qsort(cmap, 4, sizeof(PixelPacket), redcmp);

    // blue holds the new index position, which will be the palm output level
    for (int v = 0; v < 4; v++)
    {
        cmap[v].blue = 3 - v;
    }

    // sort back to original mapping
    qsort(cmap, 4, sizeof(PixelPacket), greencmp);

    unsigned int mask = 2^bitDepth - 1;
    int pixelsPerByte = 8 / bitDepth;
    int pos = 0;

    for (unsigned int i=0; i < mImageP->rows; i++)
    {
        Byte curByte = 0;
        unsigned int j;
        for (j=0; j < mImageP->columns; j++)
        {
            curByte |= (cmap[(*ip)].blue & mask);
            ip++;

            if (((j + 1) % pixelsPerByte) == 0)
            {
                dataP[pos++] = curByte;
                curByte = 0;
            }
            else
            {
                curByte = curByte << bitDepth;
            }
        }
        if (j % pixelsPerByte != 0)
        {
            curByte = curByte << (8 - bitDepth * (j % pixelsPerByte));
            dataP[pos++] = curByte;
        }
        pos += padding;
    }

    int err = mOutputTransportP->put(dataP, datasize, true);
    delete [] dataP;

    free(cmap);

    return err;
}

BLImageTransformerFactory::~BLImageTransformerFactory()
{
```

```
}

int
BLImageTransformerFactory::initialize(BLTransformManager *managerP)
{
    managerP->registerTransformation(BLTransformManager::kJPEGType,
        BLTransformManager::kPalmBMPType, this);
    managerP->registerTransformation(BLTransformManager::kGIFType,
        BLTransformManager::kPalmBMPType, this);
    managerP->registerTransformation(BLTransformManager::kPNGType,
        BLTransformManager::kPalmBMPType, this);
    managerP->registerTransformation(BLTransformManager::kWBMPType,
        BLTransformManager::kPalmBMPType, this);


    managerP->registerTransformation(BLTransformManager::kJPEGType,
        BLTransformManager::kGIFType, this);
    managerP->registerTransformation(BLTransformManager::kGIFType,
        BLTransformManager::kGIFType, this);
    managerP->registerTransformation(BLTransformManager::kPNGType,
        BLTransformManager::kGIFType, this);
    managerP->registerTransformation(BLTransformManager::kWBMPType,
        BLTransformManager::kGIFType, this);

    /*managerP->registerTransformation(BLTransformManager::kJPEGType,
        BLTransformManager::kPNGType, this);
    managerP->registerTransformation(BLTransformManager::kGIFType,
        BLTransformManager::kPNGType, this);
    managerP->registerTransformation(BLTransformManager::kPNGType,
        BLTransformManager::kPNGType, this);
    managerP->registerTransformation(BLTransformManager::kWBMPType,
        BLTransformManager::kPNGType, this);*/


    return 0;
}

const char*
BLImageTransformerFactory::getName()
{
    return "BLImageTransformerFactory";
}

BLTransformation*
BLImageTransformerFactory::makeTransformation(BLTransformManager::ContentType fromType,
                                             BLTransformManager::ContentType toType,
                                             BLClientInfo* infoP,
                                             BLTransportStream *streamP)
{
    BLImageTransformer *transformerP;

    transformerP = new BLImageTransformer(fromType, toType);

    if (transformerP == NULL)
    {
        return NULL;
    }

    if (transformerP->init(streamP, this) < 0)
    {
        delete transformerP;
        return NULL;
    }

    transformerP->setClientInfo(infoP);

    return transformerP;
}
// server.cpp

//#include "ace/Service_Config.h"
#include "BLHttpAcceptor.h"
#include <stdio.h>

#ifndef ACE_WIN32
```

```
class NullHandler : public ACE_Event_Handler
{
public:
    virtual int handle_signal (int signum, siginfo_t * = 0, ucontext_t * = 0)
    {
        return 0;
    }
};
#endif

int
main (int argc, char *argv[])
{
    cout << "Starting BLServer..." << endl;

  // Create an adapter to end the event loop.
  ACE_Sig_Adapter sa ((ACE_Sig_Handler_Ex) ACE_Reactor::end_event_loop);

  ACE_Sig_Set sig_set;
  sig_set.sig_add (SIGINT);
  sig_set.sig_add (SIGQUIT);

  // Register ourselves to receive signals so we can shut down
  // gracefully.
  if (ACE_Reactor::instance ()->register_handler (sig_set,
                                                  &sa) == -1)
    ACE_ERROR_RETURN ((LM_ERROR,
                       "%p\n"),
                      -1);

    // null handler for sigpipe
#ifndef ACE_WIN32
    NullHandler nullH;
    if (ACE_Reactor::instance ()->register_handler (SIGPIPE,
                                                    &nullH) == -1)
    ACE_ERROR_RETURN ((LM_ERROR,
                       "%p\n"),
                      -1);
#endif

  // Try to link in the svc.conf entries dynamically.
  /*if (ACE_Service_Config::open (argc, argv) == -1)
    {
      if (errno != ENOENT)
        ACE_ERROR_RETURN ((LM_ERROR,
                           "%p\n",
                           "open"),
                          1);
      else // Use static linking.
        {*/
          if (ACE::debug () == 0)
            ACE_Log_Msg::disable_debug_messages ();

          // Calling ACE_SVC_INVOKE to create a new Service_Object.
          // Stash the newly created Service_Object into an
          // ACE_Service_Object_Ptr which is an <auto_ptr> specialized
          // for ACE_Service_Object.

          /*char *l_argv[3];
          char configFile[] = "-f ";// MAL_DEFAULT_CONFIG_FILE_NAME;

          l_argv[0] = configFile;
          l_argv[1] = 0;*/
          ACE_Service_Object_Ptr sp_1 = ACE_SVC_INVOKE (BLHttpAcceptor);

          if (sp_1->init (0, NULL) == -1)
            ACE_ERROR ((LM_ERROR,
                        "%p\n%a",
                        "MALServer",
                        1));

          // Run forever, performing the configured services until we
          // are shut down by a SIGINT/SIGQUIT signal.
            cout << "BLServer started." << endl;
```

```
        ACE_Reactor::run_event_loop ();

        // Destructors of ACE_Service_Object_Ptr's automagically
        // call fini().
/*      }
    }
  else // Use dynamic linking.
    {
      if (ACE::debug () == 0)
        ACE_Log_Msg::disable_debug_messages ();

      // Run forever, performing the configured services until we are
      // shut down by a SIGINT/SIGQUIT signal.
        cout << "BLServer started." << endl;
      ACE_Reactor::run_event_loop ();
    }*/

  return 0;
}
// BLDocNormalizer.cpp

#include "BLDocNormalizer.h"

#ifdef ACE_WIN32
#pragma warning(disable:4786)
#endif

BLDocNormalizer::BLDocNormalizer(BLDocStream *streamP)
: mDocStreamP(streamP),
  mDocTypeP(NULL)
{
}

int
BLDocNormalizer::beginDoc(BLDocType *docTypeP)
{
    mDocTypeP = docTypeP;

    mContextVector.push_back(new Context);
    return mDocStreamP->beginDoc(docTypeP);
}

int
BLDocNormalizer::endDoc()
{
    // close all elements
    while (mContextVector.size() > 0)
    {
        Context *contextP = mContextVector.back();
        while (contextP->mOpenElems.size() > 0)
        {
            if (mDocStreamP->endElement(contextP->mOpenElems.back().getTok()) < 0)
                return -1;
            contextP->mOpenElems.pop_back();
        }
        delete contextP;
        mContextVector.pop_back();
    }
    return mDocStreamP->endDoc();
}

int
BLDocNormalizer::charData(const char* data, int length)
{
    mCData = data;
    mCDataLength = length;
    mElement.setTok(BLDocType::kCDataElement);

    return beginElement_i(&mElement);
}

int
BLDocNormalizer::beginElement(BLElement *elemP)
{
    // validate attrs
```

```
    BLElementDef *defP = mDocTypeP->getElementDef(elemP->getTok());
    if (!defP->validateElement(elemP))
        return 0;

    return beginElement_i(elemP);
}

int
BLDocNormalizer::beginElement_i(BLElement *elemP)
{
    if (mContextVector.size() == 0)
        return -1;
    Context *curContextP = mContextVector.back();

    BLElementDef *defP = mDocTypeP->getElementDef(elemP->getTok());
    if (!defP->getEmptyOK())
    {
        // check to see if it is already pending
        if (mPendingElems.size() > 0)
        {
            for (ElemVector::iterator i = mPendingElems.begin();
                 i != mPendingElems.end();
                 i++)
            {
                if (i->getTok() == elemP->getTok())
                {
                    mPendingElems.erase(i, mPendingElems.end());
                    break;
                }
            }
        }

        mPendingElems.push_back(*elemP);
        return 0;
    }
    else if (mPendingElems.size() > 0)
    {
        // open them all up
        for (ElemVector::iterator i = mPendingElems.begin();
             i != mPendingElems.end();
             i++)
        {
            BLElement *pendingElemP = i;
            openElement(pendingElemP);
        }
    }

    // if we have elements waiting to be opened
    if (curContextP->mClosedElems.size() > 0)
    {
        int backTok = curContextP->mClosedElems.back().getTok();
        if (curContextP->mOpenElems.size() > 0)
        {
            if (defP->getShortestPath(backTok) != NULL)
            {
                if (openElement(elemP) < 0)
                    return -1;
                return openElems();
            }
        }
        defP = mDocTypeP->getElementDef(curContextP->mOpenElems.back().getTok());
        if (defP->getShortestPath(backTok) != NULL)
        {
            if (openElems() < 0)
                    return -1;
            return openElement(elemP);
        }
    }

    return openElement(elemP);
}

int
BLDocNormalizer::openElement(BLElement *elemP)
{
```

```
    Context *curContextP = mContextVector.back();
    BLElementDef *defP = mDocTypeP->getElementDef(elemP->getTok());

    if (defP->isEmpty())
        elemP->setEmpty(true);

    // handle root case
    if (curContextP->mOpenElems.size() == 0)
    {
        if (curContextP == mContextVector.front())
        {
            BLElementDef *rootP = mDocTypeP->getRootElemDef();
            if (elemP->getTok() != rootP->getTok())
            {
                mElement.setTok(rootP->getTok());
                curContextP->mOpenElems.push_back(mElement);
                if (mDocStreamP->beginElement(&mElement) < 0)
                    return -1;
            }
        }
        else
            return -1;
    }

    if (!defP->isEmpty())
    {
        // check if element already open in this context, if so close it
        for (ElemVector::reverse_iterator ri = curContextP->mOpenElems.rbegin();
               ri != curContextP->mOpenElems.rend();
               ri++)
        {
            if (ri->getTok() == elemP->getTok())
                return reopen(elemP);
        }
    }

    // check to see if we can get there from here
    BLElementDef *topElemP =
mDocTypeP->getElementDef(curContextP->mOpenElems.back().getTok());
    topElemP = topElemP->getShortestPath(elemP->getTok());
    if (topElemP == NULL)
        return 0;

    // traverse the path
    while (topElemP->getTok() != elemP->getTok())
    {
        mElement.setTok(topElemP->getTok());
        mDocStreamP->beginElement(&mElement);
        if (topElemP->hasNewContext())
        {
            curContextP = new Context;
            mContextVector.push_back(curContextP);
        }
        curContextP->mOpenElems.push_back(mElement);

        topElemP = topElemP->getShortestPath(elemP->getTok());
    }

    if (defP->hasNewContext())
    {
        curContextP = new Context;
        mContextVector.push_back(curContextP);
    }

    // check to see if it should be empty
    if (!elemP->isEmpty())
    {
        curContextP->mOpenElems.push_back(*elemP);
    }

    if (elemP->getTok() == BLDocType::kCDataElement)
        return mDocStreamP->charData(mCData, mCDataLength);
    else
        return mDocStreamP->beginElement(elemP);
}
```

```
int
BLDocNormalizer::endElement(int elemTok)
{
    if (mContextVector.size() == 0)
        return 0;
    if (mPendingElems.size() > 0)
    {
        for (ElemVector::iterator i = mPendingElems.begin();
               i != mPendingElems.end();
               i++)
        {
            if (i->getTok() == elemP->getTok())
            {
                mPendingElems.erase(i, mPendingElems.end());
                return 0;
            }
        }
    }

    Context *curContextP = mContextVector.back();

    // check that it is open
    bool open = false;
    ElemVector::reverse_iterator ri;
    for (ri = curContextP->mOpenElems.rbegin();
           ri != curContextP->mOpenElems.rend();
           ri++)
    {
        if ((*ri)->getTok() == elemTok)
        {
            open = true;
            break;
        }
    }
    if (!open)
        return 0;

    if (closeElem(elemTok) < 0)
        return -1;

    return 0;
}

int
BLDocNormalizer::reopen(BLElement *elemP)
{
    int elemTok = elemP->getTok();

    // close it and elements above it
    ElemVector::reverse_iterator ri;
    for (ri = curContextP->mOpenElems.rbegin();
           ri != curContextP->mOpenElems.rend();
           ri++)
    {
        if (mDocStreamP->endElement((*ri)->getTok()) < 0)
            return -1;

        if ((*ri)->getTok() == elemTok)
            break;
    }

    // set it to new element
    *ri = *elemP;

    // reopen everything
    for (ElemVector::iterator i = ri;
           i != curContextP->mOpenElems.end();
           i++)
    {
        BLElement *openElemP = i;
        if (mDocStreamP->beginElement(openElemP) < 0)
            return -1;
    }
```

```
    return 0;
}

int
BLDocNormalizer::closeElem(int elemTok)
{
    ElemVector *curContextP = mContextVector.back();
    bool hardClose = mDocTypeP->getElementDef(elemTok)->hasHardClose();

    // close it and elements above it
    for (ElemVector::reverse_iterator ri = curContextP->mOpenElems.rbegin();
         ri != curContextP->mOpenElems.rend();
         ri++)
    {
        if (mDocStreamP->endElement(ri->getTok()) < 0)
            return -1;
        curContextP->mOpenElems.pop_back();

        if (ri->getTok() == elemTok)
        {
            break;
        }
        else if (!hardClose)
        {
            BLElement *elemP = ri;
            curContextP->mClosedElems.push_back(*elemP);
        }
    }

    // if end of context, close it out
    if (mDocTypeP->getElementDef(elemTok)->hasNewContext())
    {
        delete curContextP;
        mContextVector.pop_back();
    }

    return 0;
}

int
BLDocNormalizer::openElems()
{
    ElemVector *curContextP = mContextVector.back();

    // if element immediately above it is valid in new element, reopen it, etc
    for (ElemVector::reverse_iterator ri = curContextP->mClosedElems.rbegin();
         ri != curContextP->mClosedElems.rend();
         ri++)
    {
        BLElement *elemP = ri;
        if (openElement(elemP) < 0)
            return -1;
    }
    curContextP->mClosedElems.clear();

    return 0;
}

// BLDocTransformer.cpp

#include "BLDocTransformer.h"
#include "BLXmlParser.h"
#include "BLDocNormalizer.h"
#include "BLXmlOutput.h"
#include "BLWbxmlOutput.h"
//#include "BLHtml2WmlAdapter.h"

#ifdef ACE_WIN32
#pragma warning(disable:4786)
#endif

BLHtmlDocType* BLDocTransformer::sHtmlDocType = NULL;
BLWmlDocType* BLDocTransformer::sWmlDocType = NULL;
BLWmlcTable* BLDocTransformer::sWmlcTable = NULL;
```

```
BLDocTransformer::BLDocTransformer(BLTransformManager::ContentType fromType,
                                   BLTransformManager::ContentType toType)
    : BLTransformation(fromType, toType),
    mParserP(NULL),
    mNormalizerP(NULL),
    mAdapterP(NULL),
    mOutputP(NULL)
{
}

BLDocTransformer::~BLDocTransformer()
{
    delete mParserP;
    delete mNormalizerP;
    delete mAdapterP;
    delete mOutputP;
}

int
BLDocTransformer::init(BLTransportStream *streamP)
{
    if (mToType == BLTransformManager::kWMLType)
    {
        ACE_NEW_RETURN(mOutputP,
                       BLXmlOutput(streamP, mToType),
                       -1);
    }
    else if (mToType == BLTransformManager::kWMLCType)
    {
        ACE_NEW_RETURN(mOutputP,
                       BLWbxmlOutput(streamP, sWmlcTable, mToType),
                       -1);
    }
    else
    {
        return -1;
    }

    ACE_NEW_RETURN(mNormalizerP,
                   BLDocNormalizer(mOutputP),
                   -1);

    if (mFromType == BLTransformManager::kWMLType)
    {
        ACE_NEW_RETURN(mParserP,
                       BLXmlParser(sWmlDocType, mNormalizerP),
                       -1);
    }
    else if (mFromType == BLTransformManager::kHTMLType)
    {
        /*ACE_NEW_RETURN(mParserP,
                       BLHtmlParser(sHtmlDocType, mNormalizerP),
                       -1);*/ return -1;
    }
    else
    {
        return -1;
    }

    return 0;
}

BLTransportStream*
BLDocTransformer::getTransportStream()
{
    return mParserP;
}

int
BLDocTransformerFactory::initialize(BLTransformManager *managerP)
{
    managerP->registerTransformation(BLTransformManager::kWMLType,
BLTransformManager::kWMLType, this);
    managerP->registerTransformation(BLTransformManager::kWMLType,
BLTransformManager::kWMLCType, this);
```

```
    managerP->registerTransformation(BLTransformManager::kHTMLType,
BLTransformManager::kWMLType, this);
    managerP->registerTransformation(BLTransformManager::kHTMLType,
BLTransformManager::kWMLCType, this);

    if (mHtmlDocType.initialize() < 0 ||
        mWmlDocType.initialize() < 0 ||
        mWmlcTable.initialize() < 0)
       return -1;

    BLDocTransformer::sHtmlDocType = &mHtmlDocType;
    BLDocTransformer::sWmlDocType = &mWmlDocType;
    BLDocTransformer::sWmlcTable = &mWmlcTable;

    return 0;
}

const char*
BLDocTransformerFactory::getName()
{
    return "BLDocTransformer";
}

BLTransformation*
BLDocTransformerFactory::makeTransformation(BLTransformManager::ContentType fromType,
                                            BLTransformManager::ContentType toType,
                                            BLClientInfo* /*infoP*/,
                                            BLTransportStream *streamP)
{
    BLDocTransformer *transformP;
    ACE_NEW_RETURN(transformP,
                   BLDocTransformer(fromType, toType),
                   NULL);
    if (transformP->init(streamP) < 0)
    {
        delete transformP;
        return NULL;
    }
    return transformP;
}
// BLDocType.cpp

#include "BLDocType.h"
#define kMaxAttrs 10


BLElementDef::BLElementDef()
:   mInPath(false),
    mNewContext(false),
    mHardClose(false),
    mIgnoreWhitespace(false),
    mPreserveWhitespace(false),
    mResetWhitespace(false),
    mClass(0),
    mNumAttrs(0),
    mEmptyOK(true),
    mElemPathsP(NULL),
    mElemDistancesP(NULL),
    mAttrsP(NULL),
    mTok(0)
{
}

BLElementDef::~BLElementDef()
{
    delete[] mElemPathsP;
    delete[] mAttrsP;
    delete[] mAttrIndexesP;
}

int
BLElementDef::init(int elemTok, int numElems, int numAttrs)
{
    mTok = elemTok;
```

```
    ACE_NEW_RETURN(mElemPathsP,
                   BLElementDef* [numElems],
                   -1);
    ACE_NEW_RETURN(mAttrsP,
                   BLAttributeDef* [numAttrs],
                   -1);
    ACE_NEW_RETURN(mAttrIndexesP,
                   unsigned char [numAttrs],
                   -1);

    ACE_OS::memset(mElemPathsP, 0, numElems * sizeof(BLElementDef*));
    ACE_OS::memset(mAttrsP, 0, numAttrs * sizeof(BLAttributeDef*));
    ACE_OS::memset(mAttrIndexesP, -1, numAttrs * sizeof(unsigned char));

    return 0;
}

void
BLElementDef::addAttribute(BLAttributeDef *attrP)
{
    if (mNumAttrs >= kMaxAttrs)
        return;

    mAttrsP[attrP->getTok()] = attrP;
    mAttrIndexesP[attrP->getTok()] = mNumAttrs++;

    if (attrP->isRequired())
        mRequiredAttrs.push_back(attrP);
}

void
BLElementDef::addElement(BLElementDef *elemP)
{
    mElems.push_back(elemP);
}

void
BLElementDef::removeElement(BLElementDef *elemP)
{
    for (std::vector<BLElementDef*>::iterator i = mElems.begin();
         i != mElems.end();
         i++)
    {
        if (*i == elemP)
            mElems.erase(i);
    }
}

int
BLElementDef::initShortestPath(BLElementDef* elemP)
{
    if (elemP == this)
        return 0;
    if (mInPath)
        return -1;
    if (mElemDistancesP[elemP->getTok()] != -1)
        return mElemDistancesP[elemP->getTok()];

    int minPath = -1;
    mInPath = true;

    for (std::vector<BLElementDef*>::iterator i = mElems.begin();
         i != mElems.end();
         i++)
    {
        int path = (*i)->initShortestPath(elemP);
        if (path < 0)
            continue;
        if (minPath < 0 ||
            path < minPath)
        {
            if (path == 0 ||
                !(*i)->hasRequiredAttrs())
            {
                minPath = path;
```

```
                mElemPathsP[elemP->getTok()] = *i;
            }
        }
    }

    mInPath = false;
    if (minPath < 0)
    {
        mElemDistancesP[elemP->getTok()] = -2;
        return -2;
    }

    mElemDistancesP[elemP->getTok()] = minPath + 1;
    return minPath + 1;
}

BLDocType::BLDocType(int numElems)
: mNumElements(numElems),
  mElementDefs(NULL),
  mElementStrings(NULL),
  mAttributeStrings(NULL),
  mValueStrings(NULL)
{
}

BLDocType::~BLDocType()
{
    delete[] mElementDefs;
    delete[] mElementStrings;
    delete[] mAttributeStrings;
    delete[] mValueStrings;

    for (std::vector<BLAttributeDef*>::iterator i = mAttributeDefs.begin();
         i != mAttributeDefs.end();
         i++)
    {
      BLAttributeDef *attrP = *i;
      delete attrP;
    }
}

int
BLDocType::initTables(int numElems, int numAttrs, int numValues)
{
    ACE_NEW_RETURN(mElementDefs,
                   BLElementDef[numElems],
                   -1);
    ACE_NEW_RETURN(mElementStrings,
                   char* [numElems],
                   -1);
    ACE_NEW_RETURN(mAttributeStrings,
                   char* [numAttrs],
                   -1);
    ACE_NEW_RETURN(mValueStrings,
                   char* [numValues],
                   -1);

    ACE_OS::memset(mElementStrings, 0, numElems * sizeof(char*));
    ACE_OS::memset(mAttributeStrings, 0, numAttrs * sizeof(char*));
    ACE_OS::memset(mValueStrings, 0, numValues * sizeof(char*));

    for (int i=0; i<numElems; i++)
    {
        if (mElementDefs[i].init(i, numElems, numAttrs) < 0)
            return -1;
    }

    return 0;
}

int
BLDocType::initPaths()
{
    int i;
    BLElementDef *rootElemP = getRootElemDef();
```

```
    for (i=0; i<mNumElements; i++)
    {
        ACE_NEW_RETURN(mElementDefs[i].mElemDistancesP,
                                  int [mNumElements],
                                  -1);
        ACE_OS::memset(mElementDefs[i].mElemDistancesP, -1, mNumElements * sizeof(int));
    }

    for (i=0; i<mNumElements; i++)
    {
        rootElemP->initShortestPath(&mElementDefs[i]);
    }

    for (i=0; i<mNumElements; i++)
    {
        delete[] mElementDefs[i].mElemDistancesP;
    }
    return 0;
}

void
BLDocType::addClassToElem(int elem, int elemClass)
{
    for (int i=0; i<mNumElements; i++)
    {
        if (mElementDefs[i].mClass & elemClass)
            mElementDefs[elem].addElement(&mElementDefs[i]);
    }
}

void
BLDocType::addClassToClass(int superClass, int subclass)
{
    for (int i=0; i<mNumElements; i++)
    {
        if (mElementDefs[i].mClass & subclass)
            mElementDefs[i].addToClass(superClass);
    }
}

// adds all the elems in elemClass to all the elems in toClass
void
BLDocType::addElemsToClass(int toClass, int elemClass)
{
    for (int i=0; i<mNumElements; i++)
    {
        if (mElementDefs[i].mClass & toClass)
        {
            for (int j=0; j<mNumElements; j++)
            {
                if (mElementDefs[j].mClass & elemClass)
                    mElementDefs[i].addElement(&mElementDefs[j]);
            }
        }
    }
}

void
BLDocType::addElementTok(char* string, int tok)
{
    mElementStrings[tok] = string;
    mElementToks.bindCaselessToken(string, tok);
}

void
BLDocType::addAttributeTok(char* string, int tok)
{
    mAttributeStrings[tok] = string;
    mAttributeToks.bindCaselessToken(string, tok);
}

void
BLDocType::addValueTok(char* string, int tok)
{
    mValueStrings[tok] = string;
```

```
    mValueToks.bindCaselessToken(string, tok);
}

void
BLDocType::addEntityTok(char* string, int tok)
{
    mEntityToks.bindToken(string, tok);
}

BLAttributeDef*
BLDocType::makeAttrDef(int attrTok, BLAttribute::Type attrType, bool required)
{
    BLAttributeDef *defP = new BLAttributeDef(attrTok, attrType, required, &mValueToks);
    mAttributeDefs.push_back(defP);

    return defP;
}

bool
BLElementDef::validateElement(BLElement *elem)
{
    bool haveAttrs[kMaxAttrs];
    ACE_OS::memset(haveAttrs, 0, kMaxAttrs * sizeof(bool));

    BLElement::AttrVector *attrsP = elem->getAttrVector();
    BLElement::AttrVector::iterator i = attrsP->begin();
    while (i != attrsP->end())
    {
        BLAttributeDef *attrDefP = mAttrsP[i->getTok()];
        if (attrDefP == NULL ||
             haveAttrs[mAttrIndexesP[i->getTok()]] == true ||
             !attrDefP->verifyValue(&(*i)))
        {
             attrsP->erase(i);
        }
        else
        {
            haveAttrs[mAttrIndexesP[i->getTok()]] = true;
            i++;
        }
    }

    bool haveRequireds = true;
    if (mRequiredAttrs.size() > 0)
    {
        for (std::vector<BLAttributeDef*>::iterator i = mRequiredAttrs.begin();
               i != mRequiredAttrs.end();
               i++)
        {
            if (!haveAttrs[mAttrIndexesP[(*i)->getTok()]])
            {
                return false;
            }
        }
    }

    return true;
}

bool
BLAttributeDef::verifyValue(BLAttribute *attrP)
{
    if (mType == attrP->getType())
        return true;
    if (attrP->getType() != BLAttribute::kCDataType)
        return false;

    attrP->setType(mType);
    char *cdata = attrP->getCDataValue();

    switch (mType)
    {
    case BLAttribute::kTokType:
        {
            int tok = mValueTokTableP->getCaselessToken(cdata);
```

```
            if (tok == -1)
                return false;
            for (std::vector<int>::iterator i = mValueToks.begin();
                   i != mValueToks.end();
                   i++)
            {
                if (*i == tok)
                {
                    attrP->setTokValue(tok);
                    return true;
                }
            }
        }
        break;

    case BLAttribute::kIntType:
        {
            if (cdata[0] == '\0')
                return false;
            char *endPtr;
            int value = ACE_OS::strtol(cdata, &endPtr, 10);
            if (*endPtr == '\0')
            {
                attrP->setIntValue(value);
                return true;
            }
        }
        break;

    case BLAttribute::kBoolType:
        if (ACE_OS::strcasecmp(cdata, "true") == 0)
        {
            attrP->setBoolValue(true);
            return true;
        }
        else if (ACE_OS::strcasecmp(cdata, "false") == 0)
        {
            attrP->setBoolValue(false);
            return true;
        }
        break;
    case BLAttribute::kLengthType:
        {
            int value = ACE_OS::atoi(cdata);
            if (value == 0)
                return false;

            if (ACE_OS::strchr(cdata, '%') != NULL)
                attrP->setIntValue(-value);
            else
                attrP->setIntValue(value);

            return true;
        }
        break;
    case BLAttribute::kNoValueType:
        return true;
    }

    return false;
}
// BLHtmlDocType.cpp

#include "BLHtmlDocType.h"

enum {
    kFontClass          = 1,
    kPhraseClass        = 2^1,
    kSpecialClass       = 2^2,
    kFormClass          = 2^3,
    kTextClass          = 2^4,
    kBlockClass         = 2^5,
    kFlowClass          = 2^6,
    kListClass          = 2^7,
    kBodyContentClass   = 2^8,
```

```
    kHeadMiscClass      = 2^9,
    kHeadingClass       = 2^10,
};

BLHtmlDocType::BLHtmlDocType()
: BLDocType(kNumElements)
{
}

int
BLHtmlDocType::initialize()
{
    if (initTables(kNumElements, kNumAttrs, kNumValues) < 0)
        return -1;

    initClasses();
    initElements();
    if (initPaths() < 0)
        return -1;

    initElementToks();
    initAttributeToks();
    initValueToks();
    initEntityToks();

    return 0;
}

void
BLHtmlDocType::initClasses()
{
    // head.misc
    mElementDefs[kScriptElement]       .addToClass(kHeadMiscClass);
    mElementDefs[kStyleElement]    .addToClass(kHeadMiscClass);
    mElementDefs[kMetaElement]         .addToClass(kHeadMiscClass);

    // heading
    mElementDefs[kHeading1Element] .addToClass(kHeadingClass);
    mElementDefs[kHeading2Element] .addToClass(kHeadingClass);
    mElementDefs[kHeading3Element] .addToClass(kHeadingClass);
    mElementDefs[kHeading4Element] .addToClass(kHeadingClass);
    mElementDefs[kHeading5Element] .addToClass(kHeadingClass);
    mElementDefs[kHeading6Element] .addToClass(kHeadingClass);

    // list
    mElementDefs[kUnorderedListElement]    .addToClass(kListClass);
    mElementDefs[kOrderedListElement].addToClass(kListClass);
    mElementDefs[kCDataElement]    .addToClass(kListClass);
    mElementDefs[kCDataElement]    .addToClass(kListClass);

    // font
    mElementDefs[kTeleTypeElement] .addToClass(kFontClass);
    mElementDefs[kItalicElement]        .addToClass(kFontClass);
    mElementDefs[kBoldElement]          .addToClass(kFontClass);
    mElementDefs[kUnderlineElement].addToClass(kFontClass);
    mElementDefs[kStrikeElement]        .addToClass(kFontClass);
    mElementDefs[kBigElement]           .addToClass(kFontClass);
    mElementDefs[kSmallElement]    .addToClass(kFontClass);
    mElementDefs[kSubscriptElement].addToClass(kFontClass);
    mElementDefs[kSuperscriptElement].addToClass(kFontClass);

    // phrase
    mElementDefs[kEmphasisElement] .addToClass(kPhraseClass);
    mElementDefs[kStrongElement]        .addToClass(kPhraseClass);

    // special
    mElementDefs[kAnchorElement]        .addToClass(kSpecialClass);
    mElementDefs[kImageElement]    .addToClass(kSpecialClass);
    mElementDefs[kFontElement]          .addToClass(kSpecialClass);
    mElementDefs[kLinebreakElement].addToClass(kSpecialClass);
    mElementDefs[kScriptElement]        .addToClass(kSpecialClass);
    mElementDefs[kMapElement]           .addToClass(kSpecialClass);

    // form
    mElementDefs[kInputElement]    .addToClass(kFormClass);
```

```
    mElementDefs[kSelectElement]      .addToClass(kFormClass);
    mElementDefs[kTextAreaElement] .addToClass(kFormClass);

    // text
    mElementDefs[kCDataElement]    .addToClass(kTextClass);
    addClassToClass(kTextClass, kFontClass);
    addClassToClass(kTextClass, kPhraseClass);
    addClassToClass(kTextClass, kSpecialClass);
    addClassToClass(kTextClass, kFormClass);

    // block
    mElementDefs[kParagraphElement]    .addToClass(kBlockClass);
    mElementDefs[kPreElement]               .addToClass(kBlockClass);
    mElementDefs[kDefinitionListElement].addToClass(kBlockClass);
    mElementDefs[kDivElement]               .addToClass(kBlockClass);
    mElementDefs[kCenterElement]            .addToClass(kBlockClass);
    mElementDefs[kBlockQuoteElement]        .addToClass(kBlockClass);
    mElementDefs[kFormElement]              .addToClass(kBlockClass);
    mElementDefs[kHorizontalRuleElement].addToClass(kBlockClass);
    mElementDefs[kTableElement]        .addToClass(kBlockClass);
    addClassToClass(kBlockClass, kListClass);

    // flow
    addClassToClass(kFlowClass, kTextClass);
    addClassToClass(kFlowClass, kBlockClass);

    // body.content
    addClassToClass(kBodyContentClass, kHeadingClass);
    addClassToClass(kBodyContentClass, kTextClass);
    addClassToClass(kBodyContentClass, kBlockClass);

    // font class
    addElemsToClass(kFontClass, kTextClass);
    // phrase class
    addElemsToClass(kPhraseClass, kTextClass);
}

void
BLHtmlDocType::initElements()
{
    BLAttributeDef *cdataSizeImp       = makeAttrDef(kSizeAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *cdataSizeReq       = makeAttrDef(kSizeAttr, BLAttribute::kCDataType,
true);
    BLAttributeDef *cdataColorImp      = makeAttrDef(kColorAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *cdataBgcolorImp= makeAttrDef(kBackgroundColorAttr,
BLAttribute::kCDataType, false);
    BLAttributeDef *cdataTextImp       = makeAttrDef(kTextAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *cdataLinkImp       = makeAttrDef(kLinkAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *cdataVlinkImp      = makeAttrDef(kVisitedLinkAttr,
BLAttribute::kCDataType, false);
    BLAttributeDef *cdataAlinkImp      = makeAttrDef(kActiveLinkAttr,
BLAttribute::kCDataType, false);
    BLAttributeDef *tokTAlignImp       = makeAttrDef(kAlignAttr, BLAttribute::kTokType,
false);
     tokTAlignImp->addValueTok(kLeftValue);
     tokTAlignImp->addValueTok(kCenterValue);
     tokTAlignImp->addValueTok(kRightValue);
     BLAttributeDef *cdataNameImp      = makeAttrDef(kNameAttr, BLAttribute::kCDataType,
false);
     BLAttributeDef *cdataHrefImp      = makeAttrDef(kHrefAttr, BLAttribute::kCDataType,
false);
     BLAttributeDef *cdataHrefReq      = makeAttrDef(kHrefAttr, BLAttribute::kCDataType,
true);
     BLAttributeDef *tokShapeImp    = makeAttrDef(kShapeAttr, BLAttribute::kTokType, false);
     tokShapeImp->addValueTok(kRectValue);
     tokShapeImp->addValueTok(kCircleValue);
     tokShapeImp->addValueTok(kPolyValue);
     BLAttributeDef *cdataCoordsImp = makeAttrDef(kCoordsAttr, BLAttribute::kCDataType,
false);
     BLAttributeDef *novalueNoHrefImp   = makeAttrDef(kNoHrefAttr, BLAttribute::kNoValueType,
false);
```

```
    BLAttributeDef *cdataAltImp     = makeAttrDef(kAltAttr, BLAttribute::kCDataType, false);
    BLAttributeDef *cdataSrcReq     = makeAttrDef(kSrcAttr, BLAttribute::kCDataType, true);
    BLAttributeDef *cdataSrcImp     = makeAttrDef(kSrcAttr, BLAttribute::kCDataType, false);
    BLAttributeDef *tokIAlignImp         = makeAttrDef(kAlignAttr, BLAttribute::kTokType,
false);
    tokIAlignImp->addValueTok(kTopValue);
    tokIAlignImp->addValueTok(kMiddleValue);
    tokIAlignImp->addValueTok(kBottomValue);
    tokIAlignImp->addValueTok(kLeftValue);
    tokIAlignImp->addValueTok(kRightValue);
    BLAttributeDef *intHeightImp         = makeAttrDef(kHeightAttr, BLAttribute::kIntType,
false);
    BLAttributeDef *intWidthImp     = makeAttrDef(kWidthAttr, BLAttribute::kIntType, false);
    BLAttributeDef *intBorderImp         = makeAttrDef(kBorderAttr, BLAttribute::kIntType,
false);
    BLAttributeDef *intHspaceImp         = makeAttrDef(kHorizontalSpaceAttr,
BLAttribute::kIntType, false);
    BLAttributeDef *intVspaceImp         = makeAttrDef(kVerticalSpaceAttr,
BLAttribute::kIntType, false);
    BLAttributeDef *cdataUseMapImp = makeAttrDef(kUseMapAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *novalueIsMapImp= makeAttrDef(kIsMapAttr, BLAttribute::kNoValueType,
false);
    BLAttributeDef *novalueNoShadeImp = makeAttrDef(kNoShadeAttr, BLAttribute::kNoValueType,
false);
    BLAttributeDef *intSizeImp           = makeAttrDef(kSizeAttr, BLAttribute::kIntType,
false);
    BLAttributeDef *lengthWidthImp = makeAttrDef(kWidthAttr, BLAttribute::kLengthType,
false);
    BLAttributeDef *intStartImp     = makeAttrDef(kStartAttr, BLAttribute::kIntType, false);
    BLAttributeDef *cdataActionImp = makeAttrDef(kActionAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *cdataMethodImp = makeAttrDef(kMethodAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *cdataEncTypeImp= makeAttrDef(kEncodingTypeAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *tokTypeImp           = makeAttrDef(kTypeAttr, BLAttribute::kTokType,
false);
    tokTypeImp->addValueTok(kTextValue);
    tokTypeImp->addValueTok(kPasswordValue);
    tokTypeImp->addValueTok(kCheckboxValue);
    tokTypeImp->addValueTok(kRadioValue);
    tokTypeImp->addValueTok(kSubmitValue);
    tokTypeImp->addValueTok(kResetValue);
    tokTypeImp->addValueTok(kFileValue);
    tokTypeImp->addValueTok(kHiddenValue);
    tokTypeImp->addValueTok(kImageValue);
    BLAttributeDef *cdataValueImp        = makeAttrDef(kValueAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *novalueCheckedImp = makeAttrDef(kCheckedAttr, BLAttribute::kNoValueType,
false);
    BLAttributeDef *intMaxLengthImp= makeAttrDef(kMaxLengthAttr, BLAttribute::kIntType,
false);
    BLAttributeDef *novalueMultipleImp = makeAttrDef(kMultipleAttr,
BLAttribute::kNoValueType, false);
    BLAttributeDef *novalueSelectedImp = makeAttrDef(kSelectedAttr,
BLAttribute::kNoValueType, false);
    BLAttributeDef *intRowsImp           = makeAttrDef(kRowsAttr, BLAttribute::kIntType,
false);
    BLAttributeDef *intColsImp           = makeAttrDef(kColsAttr, BLAttribute::kIntType,
false);
    BLAttributeDef *intCellSpacingImp = makeAttrDef(kCellSpacingAttr, BLAttribute::kIntType,
false);
    BLAttributeDef *intCellPaddingImp = makeAttrDef(kCellPaddingAttr, BLAttribute::kIntType,
false);
    BLAttributeDef *tokVAlignImp         = makeAttrDef(kAlignAttr, BLAttribute::kTokType,
false);
    tokVAlignImp->addValueTok(kTopValue);
    tokVAlignImp->addValueTok(kMiddleValue);
    tokVAlignImp->addValueTok(kBottomValue);
    BLAttributeDef *tokCAlignImp         = makeAttrDef(kAlignAttr, BLAttribute::kTokType,
false);
    tokVAlignImp->addValueTok(kTopValue);
    tokVAlignImp->addValueTok(kBottomValue);
    BLAttributeDef *intRowSpanImp        = makeAttrDef(kRowSpanAttr, BLAttribute::kIntType,
```

```
false);
    BLAttributeDef *intColSpanImp        = makeAttrDef(kColSpanAttr, BLAttribute::kIntType,
false);
    BLAttributeDef *tokHttpEquivReq= makeAttrDef(kHttpEquivAttr, BLAttribute::kTokType,
false);
    tokHttpEquivReq->addValueTok(kRefreshValue);
    BLAttributeDef *cdataContentReq= makeAttrDef(kContentAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *intValueImp     = makeAttrDef(kValueAttr, BLAttribute::kIntType, false);

    // html
    mElementDefs[kHtmlElement].addElement(&mElementDefs[kHeadElement]);
    mElementDefs[kHtmlElement].addElement(&mElementDefs[kBodyElement]);
    mElementDefs[kHtmlElement].setIgnoreWhitespace();
    // basefont
    mElementDefs[kHtmlElement].addAttribute(cdataSizeReq);
    // body
    addClassToElem(kBodyElement, kBodyContentClass);
    mElementDefs[kBodyElement].addAttribute(cdataBgcolorImp);
    mElementDefs[kBodyElement].addAttribute(cdataTextImp);
    mElementDefs[kBodyElement].addAttribute(cdataLinkImp);
    mElementDefs[kBodyElement].addAttribute(cdataAlinkImp);
    mElementDefs[kBodyElement].addAttribute(cdataVlinkImp);
    mElementDefs[kBodyElement].setResetWhitespace();
    // div
    addClassToElem(kDivElement, kBodyContentClass);
    mElementDefs[kDivElement].addAttribute(tokTAlignImp);
    mElementDefs[kDivElement].setEmptyOK(false);
    mElementDefs[kDivElement].setResetWhitespace();
    // a
    addClassToElem(kAnchorElement, kTextClass);
    mElementDefs[kAnchorElement].addAttribute(cdataNameImp);
    mElementDefs[kAnchorElement].addAttribute(cdataHrefImp);
    // map
    mElementDefs[kMapElement].addElement(&mElementDefs[kAreaElement]);
    mElementDefs[kMapElement].addAttribute(cdataNameImp);
    mElementDefs[kMapElement].setIgnoreWhitespace();
    mElementDefs[kMapElement].setEmptyOK(false);
    // area
    mElementDefs[kAreaElement].addAttribute(tokShapeImp);
    mElementDefs[kAreaElement].addAttribute(cdataCoordsImp);
    mElementDefs[kAreaElement].addAttribute(cdataHrefImp);
    mElementDefs[kAreaElement].addAttribute(novalueNoHrefImp);
    mElementDefs[kAreaElement].addAttribute(cdataAltImp);
    // img
    mElementDefs[kImageElement].addAttribute(cdataSrcReq);
    mElementDefs[kImageElement].addAttribute(cdataAltImp);
    mElementDefs[kImageElement].addAttribute(tokIAlignImp);
    mElementDefs[kImageElement].addAttribute(intHeightImp);
    mElementDefs[kImageElement].addAttribute(intWidthImp);
    mElementDefs[kImageElement].addAttribute(intBorderImp);
    mElementDefs[kImageElement].addAttribute(intHspaceImp);
    mElementDefs[kImageElement].addAttribute(intVspaceImp);
    mElementDefs[kImageElement].addAttribute(cdataUseMapImp);
    mElementDefs[kImageElement].addAttribute(novalueIsMapImp);
    // hr
    mElementDefs[kHorizontalRuleElement].addAttribute(tokTAlignImp);
    mElementDefs[kHorizontalRuleElement].addAttribute(novalueNoShadeImp);
    mElementDefs[kHorizontalRuleElement].addAttribute(intSizeImp);
    mElementDefs[kHorizontalRuleElement].addAttribute(lengthWidthImp);
    // p
    addClassToElem(kParagraphElement, kTextClass);
    mElementDefs[kParagraphElement].addAttribute(tokTAlignImp);
    mElementDefs[kParagraphElement].setEmptyOK(false);
    mElementDefs[kParagraphElement].setResetWhitespace();
    // br
    mElementDefs[kLinebreakElement].setResetWhitespace();
    // headings
    addElemsToClass(kHeadingClass, kTextClass);
    mElementDefs[kHeading1Element].addAttribute(tokTAlignImp);
    mElementDefs[kHeading2Element].addAttribute(tokTAlignImp);
    mElementDefs[kHeading3Element].addAttribute(tokTAlignImp);
    mElementDefs[kHeading4Element].addAttribute(tokTAlignImp);
    mElementDefs[kHeading5Element].addAttribute(tokTAlignImp);
    mElementDefs[kHeading6Element].addAttribute(tokTAlignImp);
```

```
    mElementDefs[kHeading6Element].setEmptyOK(false);
    // pre
    addClassToElem(kPreElement, kTextClass);
    mElementDefs[kPreElement].removeElement(&mElementDefs[kImageElement]);
    mElementDefs[kPreElement].removeElement(&mElementDefs[kBigElement]);
    mElementDefs[kPreElement].removeElement(&mElementDefs[kSmallElement]);
    mElementDefs[kPreElement].removeElement(&mElementDefs[kSubscriptElement]);
    mElementDefs[kPreElement].removeElement(&mElementDefs[kSuperscriptElement]);
    mElementDefs[kPreElement].removeElement(&mElementDefs[kFontElement]);
    mElementDefs[kPreElement].setEmptyOK(false);
    mElementDefs[kPreElement].setPreserveWhitespace();
    // blockquote
    addClassToElem(kBlockQuoteElement, kBodyContentClass);
    mElementDefs[kBlockQuoteElement].setEmptyOK(false);
    mElementDefs[kBlockQuoteElement].setResetWhitespace();
    // dl
    mElementDefs[kDefinitionListElement].addElement(&mElementDefs[kDefinitionTermElement]);
    mElementDefs[kDefinitionListElement].addElement(&mElementDefs[kDefinitionDefinitionEleme
nt]);
    mElementDefs[kDefinitionListElement].setIgnoreWhitespace();
    mElementDefs[kDefinitionListElement].setEmptyOK(false);
    // ol
    mElementDefs[kOrderedListElement].addElement(&mElementDefs[kListElement]);
    mElementDefs[kOrderedListElement].addAttribute(intStartImp);
    mElementDefs[kOrderedListElement].setIgnoreWhitespace();
    mElementDefs[kOrderedListElement].setEmptyOK(false);
    // ul
    mElementDefs[kUnorderedListElement].addElement(&mElementDefs[kListElement]);
    mElementDefs[kUnorderedListElement].setIgnoreWhitespace();
    mElementDefs[kUnorderedListElement].setEmptyOK(false);
    // li
    addClassToElem(kListElement, kFlowClass);
    mElementDefs[kListElement].addAttribute(intValueImp);
    mElementDefs[kListElement].setResetWhitespace();
    // form
    addClassToElem(kFormElement, kBodyContentClass);
    mElementDefs[kFormElement].addAttribute(cdataHrefImp);
    mElementDefs[kFormElement].addAttribute(cdataMethodImp);
    mElementDefs[kFormElement].addAttribute(cdataEncTypeImp);
    mElementDefs[kFormElement].setEmptyOK(false);
    mElementDefs[kFormElement].setResetWhitespace();
    // input
    mElementDefs[kInputElement].addAttribute(tokTypeImp);
    mElementDefs[kInputElement].addAttribute(cdataNameImp);
    mElementDefs[kInputElement].addAttribute(cdataValueImp);
    mElementDefs[kInputElement].addAttribute(cdataValueImp);
    mElementDefs[kInputElement].addAttribute(novalueCheckedImp);
    mElementDefs[kInputElement].addAttribute(cdataSizeImp);
    mElementDefs[kInputElement].addAttribute(intMaxLengthImp);
    mElementDefs[kInputElement].addAttribute(cdataSrcImp);
    mElementDefs[kInputElement].addAttribute(tokIAlignImp);
    // select
    mElementDefs[kSelectElement].addElement(&mElementDefs[kOptionElement]);
    mElementDefs[kSelectElement].addAttribute(cdataNameImp);
    mElementDefs[kSelectElement].addAttribute(intSizeImp);
    mElementDefs[kSelectElement].addAttribute(novalueMultipleImp);
    mElementDefs[kSelectElement].setIgnoreWhitespace();
    mElementDefs[kSelectElement].setEmptyOK(false);
    // option
    mElementDefs[kOptionElement].addElement(&mElementDefs[kCDataElement]);
    mElementDefs[kOptionElement].addAttribute(cdataValueImp);
    mElementDefs[kOptionElement].setResetWhitespace();
    // textarea
    mElementDefs[kTextAreaElement].addElement(&mElementDefs[kCDataElement]);
    mElementDefs[kTextAreaElement].addAttribute(cdataNameImp);
    mElementDefs[kTextAreaElement].addAttribute(intRowsImp);
    mElementDefs[kTextAreaElement].addAttribute(intColsImp);
    // table
    mElementDefs[kTableElement].addElement(&mElementDefs[kTableRowElement]);
    mElementDefs[kTableElement].addAttribute(tokTAlignImp);
    mElementDefs[kTableElement].addAttribute(lengthWidthImp);
    mElementDefs[kTableElement].addAttribute(intBorderImp);
    mElementDefs[kTableElement].addAttribute(intCellSpacingImp);
    mElementDefs[kTableElement].addAttribute(intCellPaddingImp);
    mElementDefs[kTableElement].setIgnoreWhitespace();
```

```
    mElementDefs[kTableElement].setEmptyOK(false);
    // tr
    mElementDefs[kTableRowElement].addElement(&mElementDefs[kTableHeaderElement]);
    mElementDefs[kTableRowElement].addElement(&mElementDefs[kTableDataElement]);
    mElementDefs[kTableRowElement].addAttribute(tokTAlignImp);
    mElementDefs[kTableRowElement].addAttribute(tokVAlignImp);
    mElementDefs[kTableRowElement].setIgnoreWhitespace();
    // th
    addClassToElem(kTableHeaderElement, kBodyContentClass);
    mElementDefs[kTableHeaderElement].addAttribute(intRowSpanImp);
    mElementDefs[kTableHeaderElement].addAttribute(intColSpanImp);
    mElementDefs[kTableHeaderElement].addAttribute(tokTAlignImp);
    mElementDefs[kTableHeaderElement].addAttribute(tokVAlignImp);
    mElementDefs[kTableHeaderElement].addAttribute(intWidthImp);
    mElementDefs[kTableHeaderElement].addAttribute(intHeightImp);
    mElementDefs[kTableHeaderElement].setResetWhitespace();
    // td
    addClassToElem(kTableDataElement, kBodyContentClass);
    mElementDefs[kTableDataElement].addAttribute(intRowSpanImp);
    mElementDefs[kTableDataElement].addAttribute(intColSpanImp);
    mElementDefs[kTableDataElement].addAttribute(tokTAlignImp);
    mElementDefs[kTableDataElement].addAttribute(tokVAlignImp);
    mElementDefs[kTableDataElement].addAttribute(intWidthImp);
    mElementDefs[kTableDataElement].addAttribute(intHeightImp);
    mElementDefs[kTableDataElement].setResetWhitespace();
    // caption
    addClassToElem(kCaptionElement, kTextClass);
    mElementDefs[kCaptionElement].addAttribute(tokCAlignImp);
    mElementDefs[kCaptionElement].setEmptyOK(false);
    mElementDefs[kCaptionElement].setResetWhitespace();
    // head
    addClassToElem(kHeadElement, kHeadMiscClass);
    mElementDefs[kHeadElement].addElement(&mElementDefs[kTitleElement]);
    mElementDefs[kHeadElement].addElement(&mElementDefs[kBaseElement]);
    mElementDefs[kHeadElement].setIgnoreWhitespace();
    mElementDefs[kHeadElement].setEmptyOK(false);
    // title
    mElementDefs[kTitleElement].addElement(&mElementDefs[kCDataElement]);
    mElementDefs[kTitleElement].setEmptyOK(false);
    mElementDefs[kTitleElement].setResetWhitespace();
    // base
    mElementDefs[kBaseElement].addAttribute(cdataHrefReq);
    // meta
    mElementDefs[kMetaElement].addAttribute(tokHttpEquivReq);
    mElementDefs[kMetaElement].addAttribute(cdataContentReq);
}

void
BLHtmlDocType::initElementToks()
{
    addElementTok("html", kHtmlElement);
    addElementTok("tt", kTeleTypeElement);
    addElementTok("code", kTeleTypeElement);
    addElementTok("samp", kTeleTypeElement);
    addElementTok("kbd", kTeleTypeElement);
    addElementTok("var", kTeleTypeElement);
    addElementTok("i", kItalicElement);
    addElementTok("dfn", kItalicElement);
    addElementTok("cite", kItalicElement);
    addElementTok("address", kItalicElement);
    addElementTok("b", kBoldElement);
    addElementTok("u", kUnderlineElement);
    addElementTok("strike", kStrikeElement);
    addElementTok("big", kBigElement);
    addElementTok("small", kSmallElement);
    addElementTok("sub", kSubscriptElement);
    addElementTok("sup", kSuperscriptElement);
    addElementTok("em", kEmphasisElement);
    addElementTok("strong", kStrongElement);
    addElementTok("font", kFontElement);
    addElementTok("basefont", kBaseFontElement);
    addElementTok("br", kLinebreakElement);
    addElementTok("body", kBodyElement);
    addElementTok("div", kDivElement);
    addElementTok("a", kAnchorElement);
```

```
    addElementTok("center", kCenterElement);
    addElementTok("map", kMapElement);
    addElementTok("area", kAreaElement);
    addElementTok("img", kImageElement);
    addElementTok("hr", kHorizontalRuleElement);
    addElementTok("p", kParagraphElement);
    addElementTok("h1", kHeading1Element);
    addElementTok("h2", kHeading2Element);
    addElementTok("h3", kHeading3Element);
    addElementTok("h4", kHeading4Element);
    addElementTok("h5", kHeading5Element);
    addElementTok("h6", kHeading6Element);
    addElementTok("pre", kPreElement);
    addElementTok("blockquote", kBlockQuoteElement);
    addElementTok("xmp", kPreElement);
    addElementTok("listing", kPreElement);
    addElementTok("plaintext", kPreElement);
    addElementTok("dl", kDefinitionListElement);
    addElementTok("dt", kDefinitionTermElement);
    addElementTok("dd", kDefinitionDefinitionElement);
    addElementTok("ol", kOrderedListElement);
    addElementTok("ul", kUnorderedListElement);
    addElementTok("dir", kUnorderedListElement);
    addElementTok("menu", kUnorderedListElement);
    addElementTok("li", kListElement);
    addElementTok("form", kFormElement);
    addElementTok("input", kInputElement);
    addElementTok("select", kSelectElement);
    addElementTok("option", kOptionElement);
    addElementTok("textarea", kTextAreaElement);
    addElementTok("table", kTableElement);
    addElementTok("tr", kTableRowElement);
    addElementTok("th", kTableHeaderElement);
    addElementTok("td", kTableDataElement);
    addElementTok("caption", kCaptionElement);
    addElementTok("head", kHeadElement);
    addElementTok("title", kTitleElement);
    addElementTok("base", kBaseElement);
    addElementTok("meta", kMetaElement);
    addElementTok("style", kStyleElement);
    addElementTok("script", kScriptElement);
}

void
BLHtmlDocType::initAttributeToks()
{
    addAttributeTok("size", kSizeAttr);
    addAttributeTok("color", kColorAttr);
    addAttributeTok("bgcolor", kBackgroundColorAttr);
    addAttributeTok("text", kTextAttr);
    addAttributeTok("link", kLinkAttr);
    addAttributeTok("vlink", kVisitedLinkAttr);
    addAttributeTok("alink", kActiveLinkAttr);
    addAttributeTok("align", kAlignAttr);
    addAttributeTok("name", kNameAttr);
    addAttributeTok("href", kHrefAttr);
    addAttributeTok("usemap", kUseMapAttr);
    addAttributeTok("ismap", kIsMapAttr);
    addAttributeTok("noshade", kNoShadeAttr);
    addAttributeTok("nohref", kNoHrefAttr);
    addAttributeTok("shape", kShapeAttr);
    addAttributeTok("coords", kCoordsAttr);
    addAttributeTok("alt", kAltAttr);
    addAttributeTok("src", kSrcAttr);
    addAttributeTok("height", kHeightAttr);
    addAttributeTok("width", kWidthAttr);
    addAttributeTok("border", kBorderAttr);
    addAttributeTok("hspace", kHorizontalSpaceAttr);
    addAttributeTok("vspace", kVerticalSpaceAttr);
    addAttributeTok("size", kSizeAttr);
    addAttributeTok("start", kStartAttr);
    addAttributeTok("action", kActionAttr);
    addAttributeTok("method", kMethodAttr);
    addAttributeTok("enctype", kEncodingTypeAttr);
    addAttributeTok("type", kTypeAttr);
```

```
    addAttributeTok("value", kValueAttr);
    addAttributeTok("checked", kCheckedAttr);
    addAttributeTok("size", kSizeAttr);
    addAttributeTok("maxlength", kMaxLengthAttr);
    addAttributeTok("multiple", kMultipleAttr);
    addAttributeTok("selected", kSelectedAttr);
    addAttributeTok("rows", kRowsAttr);
    addAttributeTok("cols", kColsAttr);
    addAttributeTok("cellspacing", kCellSpacingAttr);
    addAttributeTok("cellpadding", kCellPaddingAttr);
    addAttributeTok("halign", kHorizontalAlignAttr);
    addAttributeTok("valign", kVerticalAlignAttr);
    addAttributeTok("rowspan", kRowSpanAttr);
    addAttributeTok("colspan", kColSpanAttr);
    addAttributeTok("content", kContentAttr);
    addAttributeTok("http-equiv", kHttpEquivAttr);
}

void
BLHtmlDocType::initValueToks()
{
    addValueTok("left", kLeftValue);
    addValueTok("center", kCenterValue);
    addValueTok("right", kRightValue);
    addValueTok("rect", kRectValue);
    addValueTok("circle", kCircleValue);
    addValueTok("poly", kPolyValue);
    addValueTok("top", kTopValue);
    addValueTok("middle", kMiddleValue);
    addValueTok("bottom", kBottomValue);
    addValueTok("get", kGetValue);
    addValueTok("post", kPostValue);
    addValueTok("text", kTextValue);
    addValueTok("password", kPasswordValue);
    addValueTok("checkbox", kCheckboxValue);
    addValueTok("radio", kRadioValue);
    addValueTok("submit", kSubmitValue);
    addValueTok("reset", kResetValue);
    addValueTok("file", kFileValue);
    addValueTok("hidden", kHiddenValue);
    addValueTok("image", kImageValue);
}

void
BLHtmlDocType::initEntityToks()
{
    addEntityTok("quot", 34);
    addEntityTok("amp", 38);
    addEntityTok("apos", 39);
    addEntityTok("lt", 60);
    addEntityTok("gt", 62);
    addEntityTok("nbsp", 160);
    addEntityTok("iexcl", 161);
    addEntityTok("cent", 162);
    addEntityTok("pound", 163);
    addEntityTok("curren", 164);
    addEntityTok("yen", 165);
    addEntityTok("brvbar", 166);
    addEntityTok("sect", 167);
    addEntityTok("uml", 168);
    addEntityTok("copy", 169);
    addEntityTok("ordf", 170);
    addEntityTok("laquo", 171);
    addEntityTok("not", 172);
    addEntityTok("shy", 173);
    addEntityTok("reg", 174);
    addEntityTok("macr", 175);
    addEntityTok("deg", 176);
    addEntityTok("plusmn", 177);
    addEntityTok("sup2", 178);
    addEntityTok("sup3", 179);
    addEntityTok("acute", 180);
    addEntityTok("micro", 181);
    addEntityTok("para", 182);
    addEntityTok("middot", 183);
```

```
    addEntityTok("cedil", 184);
    addEntityTok("supl", 185);
    addEntityTok("ordm", 186);
    addEntityTok("raquo", 187);
    addEntityTok("frac14", 188);
    addEntityTok("frac12", 189);
    addEntityTok("frac34", 190);
    addEntityTok("iquest", 191);
    addEntityTok("Agrave", 192);
    addEntityTok("Aacute", 193);
    addEntityTok("Acirc", 194);
    addEntityTok("Atilde", 195);
    addEntityTok("Auml", 196);
    addEntityTok("Aring", 197);
    addEntityTok("Arlig", 198);
    addEntityTok("Ccedil", 199);
    addEntityTok("Egrave", 200);
    addEntityTok("Eacute", 201);
    addEntityTok("Ecirc", 202);
    addEntityTok("Euml", 203);
    addEntityTok("Igrave", 204);
    addEntityTok("Iacute", 205);
    addEntityTok("Icirc", 206);
    addEntityTok("Iuml", 207);
    addEntityTok("ETH", 208);
    addEntityTok("Ntilde", 209);
    addEntityTok("Ograve", 210);
    addEntityTok("Oacute", 211);
    addEntityTok("Ocirc", 212);
    addEntityTok("Otilde", 213);
    addEntityTok("Ouml", 214);
    addEntityTok("times", 215);
    addEntityTok("Oslash", 216);
    addEntityTok("Ugrave", 217);
    addEntityTok("Uacute", 218);
    addEntityTok("Ucirc", 219);
    addEntityTok("Uuml", 220);
    addEntityTok("Yacute", 221);
    addEntityTok("THORN", 222);
    addEntityTok("szlig", 223);
    addEntityTok("agrave", 224);
    addEntityTok("aacute", 225);
    addEntityTok("acirc", 226);
    addEntityTok("atilde", 227);
    addEntityTok("auml", 228);
    addEntityTok("aring", 229);
    addEntityTok("aelig", 230);
    addEntityTok("ccedil", 231);
    addEntityTok("egrave", 232);
    addEntityTok("eacute", 233);
    addEntityTok("ecirc", 234);
    addEntityTok("euml", 235);
    addEntityTok("igrave", 236);
    addEntityTok("iacute", 237);
    addEntityTok("icirc", 238);
    addEntityTok("iuml", 239);
    addEntityTok("eth", 240);
    addEntityTok("ntilde", 241);
    addEntityTok("ograve", 242);
    addEntityTok("oacute", 243);
    addEntityTok("ocirc", 244);
    addEntityTok("otilde", 245);
    addEntityTok("ouml", 246);
    addEntityTok("divide", 247);
    addEntityTok("oslash", 248);
    addEntityTok("ugrave", 249);
    addEntityTok("uacute", 250);
    addEntityTok("ucirc", 251);
    addEntityTok("uuml", 252);
    addEntityTok("yacute", 253);
    addEntityTok("thorn", 254);
    addEntityTok("yuml", 255);
}

const char*
```

```
BLHtmlDocType::getDocTypeString()
{
    return "<!DOCTYPE HTML PUBLIC \"-//IETF//DTD HTML//EN\">";
}

BLElementDef*
BLHtmlDocType::getRootElemDef()
{
    return getElementDef(kHtmlElement);
}
// BLHtmlParser.cpp
/*
#include "BLHtmlParser.h"
#include "BLUtils.h"


BLHtmlParser::BLHtmlParser(BLDocType *docTypeP, BLDocStream *docStreamP)
: mDocTypeP(docTypeP),
  mDocStreamP(docStreamP)
{
}

void
BLHtmlParser::init(BLDocument* docP)
{
    mParseP = mParseBuf;
    mScratchP = mScratchBuf;
    mValueP = mScratchBuf;
    mState = 1;
    mScratchDistance = 0;
    mLastCharDataSpace = true;
}

// returns 0 if we find closeChar before another openChar
//         1 if we fine another openChar befor maxDistance or a closeChar before mindistance
or nothing by max distance
//         2 if we reached the end of the buffer beforer finding either
inline int
BLHtmlParser::lookahead(char closeChar,
                        int minDistance,
                        int maxDistance,
                        char *buf,
                        int bufLen)
{
    int distance = bufLen < maxDistance ? bufLen : maxDistance;

    for (int i=0; i<distance; i++)
    {
        if (buf[i] == closeChar)
        {
            mScratchDistance = 0;
            if (i + (mScratchP - mScratchBuf) < minDistance)
                return 1;
            return 0;
        }
        if (buf[i] == mLookaheadChar
            || buf[i] == '<') // not reached in '<' case, but needed for '&' case
        {
            mScratchDistance = 0;
            return 1;
        }
    }
    if (bufLen < maxDistance)
    {
        ACE_OS::memmove(mScratchP, buf, distance);
        mScratchP += distance;
        mScratchDistance = maxDistance - distance;
        mScratchMinDistance = minDistance;
        mScratchCloseChar = closeChar;
        return 2;
    }
    return 1;
}

inline void
```

```
BLHtmlParser::beginTag()
{
    *mParseP = '\0';

    int elemTok = mDocTypeP->getElementTok(mParseBuf);
    mElement.clear();
    mElement.setTok(elemTok);

    mParseP = mParseBuf;
}

inline void
BLHtmlParser::beginTagDone()
{
    char *value = mScratchBuf;

    if (mElement.getTok() != -1)
        mDocStreamP->beginElement(&mElement);

    mValueP = mScratchBuf;
}

inline void
BLHtmlParser::endTag()
{
    *mParseP = '\0';

    int elemTok = mDocTypeP->getElementTok(mParseBuf);
    if (elemTok != -1)
        mDocStreamP->endElement(elemTok);

    mParseP = mParseBuf;
}

inline void
BLHtmlParser::attribute()
{
    *mParseP = '\0';
    int attrTok = mDocTypeP->getAttributeTok(mParseBuf);
    if (attrTok != -1)
    {
        mCurAttr.first = attrToken;
        mCurAttr.second.mType = BLDocument::kCDataValue;
        mCurAttr.second.mData.cdataValue = mValueP;
        mAttrs.push_back(mCurAttr);
    }
    mLastValueSpace = true;
    mParseP = mParseBuf;
}

inline void
BLHtmlParser::value()
{
    *(mValueP++) = '\0';
}

inline void
BLHtmlParser::charData()
{
    *mParseP = '\0';
    mCurTag = BLDocument::kCDataElement;

    if (mInTitle)
    {
        int len = BLUtils::min(mParseP - mParseBuf, kTitleSize - (mTitleP - mTitleBuf));
        if (len > 0)
        {
            ACE_OS::strncpy(mTitleP, mParseBuf, len);
            mTitleP += len;
        }
    }
    else
    {
        doLinebreaks();
```

```
        if (!mIgnoreCData)
        {
            mAttrs.clear();
            mCurAttr.first = BLDocument::kCDataAttr;
            mCurAttr.second.mType = BLDocument::kCDataValue;
            mCurAttr.second.mData.cdataValue = mParseBuf;
            mAttrs.push_back(mCurAttr);
            mDocP->beginElement(BLDocument::kCDataElement, &mAttrs, true);
        }
    }
    mLastTag = mCurTag;
    mParseP = mParseBuf;
}

void
BLHtmlParser::dumpScratch()
{
    *mScratchP = '\0';

    if (!mIgnoreCData)
    {
        mAttrs.clear();
        mCurAttr.first = BLDocument::kCDataAttr;
        mCurAttr.second.mType = BLDocument::kCDataValue;
        mCurAttr.second.mData.cdataValue = mScratchBuf;
        mAttrs.push_back(mCurAttr);
        mDocP->beginElement(BLDocument::kCDataElement, &mAttrs, true);
    }
}

inline void
BLHtmlParser::doEntity(int entity)
{
    if (!mIgnoreCData && !mInTitle)
    {
        mCurTag = BLDocument::kCharEntityElement;
        doLinebreaks();

        mAttrs.clear();
        mCurAttr.first = BLDocument::kEntityAttr;
        mCurAttr.second.mType = BLDocument::kIntValue;
        mCurAttr.second.mData.intValue = entity;
        mAttrs.push_back(mCurAttr);
        mDocP->beginElement(BLDocument::kCharEntityElement, &mAttrs, true);
        mLastCharDataSpace = false;
    }
    mLastTag = mCurTag;
}

inline void
BLHtmlParser::charEntity()
{
    *mParseP = '\0';
    int c = sEntityTable.getTokenID(mParseBuf);
    if (c != -1)
        doEntity(c);

    mParseP = mParseBuf;
}

inline void
BLHtmlParser::decimalEntity()
{
    *mParseP = '\0';
    int c = ACE_OS::atoi(mParseBuf);
    if (c != 0)
        doEntity(c);

    mParseP = mParseBuf;
}

inline void
BLHtmlParser::hexEntity()
{
    *mParseP = '\0';
```

```
    int c = (char) ACE_OS::strtol(mParseBuf, NULL, 16);
    if (c != 0)
        doEntity(c);

    mParseP = mParseBuf;
}

inline void
BLHtmlParser::beginDocument()
{
    mDocP->documentBegin();
}

inline void
BLHtmlParser::endDocument()
{
    if((mState == 1) && (mParseP != mParseBuf))
            charData();
    mDocP->documentEnd();
    mDocP = NULL;
}

int
BLHtmlParser::put(char *data, int size, bool final)
{
    if (mDocP == NULL || data == NULL)
        return -1;

    if (mScratchDistance > 0)
    {
        int look = lookahead(mScratchCloseChar, mScratchMinDistance, mScratchDistance, data,
size);
        if (mLookaheadChar == '<')
        {
            switch (look)
            {
            case 0:
                if (mParseP != mParseBuf)
                    charData();
                if (mScratchChar == '/')
                {
                    mState = 10;
                }
                else
                {
                    mState = 3;
                }
                break;
            case 1:
                if (mParseP != mParseBuf)
                    charData();
                doEntity('<');
                dumpScratch();
                mLastCharDataSpace = false;
                break;
            case 2:
                if (final)
                    endDocument();
                return 0;
                break;
            }
        }
        else if (mLookaheadChar == '&')
        {
            switch (look)
            {
            case 0:
                if (mParseP != mParseBuf)
                    charData();
                mState = 13;
                break;
            case 1:
                if (mParseP != mParseBuf)
                    charData();
                doEntity('&');
```

```
                dumpScratch();
                mLastCharDataSpace = false;
                break;
            case 2:
                if (final)
                {
                    if (mParseP != mParseBuf)
                        charData();
                    doEntity('&');
                    dumpScratch();
                    mLastCharDataSpace = false;
                }
                else
                    return 0;
                break;
            }
        }
        parseBuf(mScratchBuf, mScratchP - mScratchBuf, false);
    }
    parseBuf(data, size, final);
    return 0;
}

// returns 0 normally, 1 if in the middle of lookahead
void
BLHtmlParser::parseBuf(char *data, int size, bool final)
{
    char *cp;
    int look;

    if (size > 0)
    {
        for (cp = data;
             cp != data+size;
             cp++)
        {
            if (*cp > 0x7E) // garbage
                continue;

            switch (mState)
            {
            case 1: // character data
                if (*cp <= 0x20) //whitespace
                {
                    if (!mLastCharDataSpace)
                    {
                        *(mParseP++) = ' ';
                        mLastCharDataSpace = true;
                    }
                    break;
                }
                switch (*cp)
                {
                case '<':
                    mState = 2;
                    /*mScratchP = mScratchBuf;
                    mLookaheadChar = '<';
                    look = lookahead('>', 1, kParseBufSize, cp + 1, size - (cp - data) - 1);
                    switch (look)
                    {
                    case 0:
                        if (mParseP != mParseBuf)
                            charData();
                        mState = 2;
                        break;
                    case 1:
                        if (mParseP != mParseBuf)
                            charData();
                        doEntity('<');
                        mLastCharDataSpace = false;
                        break;
                    case 2:
                        if (final)
                            endDocument();
                        return;
```

```
                break;
            }*//*
            break;
        case '&':
            mScratchP = mScratchBuf;
            mLookaheadChar = '&';
            look = lookahead(';', 2, kMaxEntitySize, cp + 1, size - (cp - data) - 1);
            switch (look)
            {
            case 0:
                if (mParseP != mParseBuf)
                    charData();
                mState = 13;
                break;
            case 1:
                if (mParseP != mParseBuf)
                    charData();
                doEntity('&');
                mLastCharDataSpace = false;
                break;
            case 2:
                if (final)
                {
                    if (mParseP != mParseBuf)
                        charData();
                    doEntity('&');
                    mLastCharDataSpace = false;
                }
                else
                    return;
                break;
            }
            break;
        case '>':
            if (mParseP != mParseBuf)
                charData();
            doEntity('>');
            mLastCharDataSpace = false;
            break;
        case '\"':
            if (mParseP != mParseBuf)
                charData();
            doEntity('\"');
            break;
        default:
            mLastCharDataSpace = false;
            *(mParseP++) = *cp;
            break;
        }
        break;

    case 2:
        // <
        if (*cp <= 0x20) //whitespace
        {
            if (mParseP != mParseBuf)
                charData();
            doEntity('<');
            *(mParseP++) = ' ';
            mLastCharDataSpace = true;
            mState = 1;
            break;
        }

        switch (*cp)
        {
        case '!':
            mState = 18;
            break;
        case '>':
            if (mParseP != mParseBuf)
                charData();
            doEntity('<');
            doEntity('>');
            mState = 1;
```

```
            break;
        default:
            mScratchP = mScratchBuf;
            mLookaheadChar = '<';
            mScratchChar = *cp;
            look = lookahead('>', 0, kParseBufSize, cp, size - (cp - data));
            switch (look)
            {
            case 0:
                if (mParseP != mParseBuf)
                    charData();
                if (*cp == '/')
                {
                    mState = 10;
                }
                else
                {
                    *(mParseP++) = CASELESS(*cp);
                    mState = 3;
                }
                break;
            case 1:
                if (mParseP != mParseBuf)
                    charData();
                doEntity('<');
                mLastCharDataSpace = false;
                break;
            case 2:
                if (final)
                    endDocument();
                return;
                break;
            }
            break;
        }
        break;

    case 3:
        // begin tag
        if (*cp <= 0x20) //whitespace
        {
            beginTag();
            mState = 4;
            break;
        }

        switch (*cp)
        {
        case '>':
            beginTag();
            beginTagDone();
            mState = 1;
            break;
        default:
            *(mParseP++) = CASELESS(*cp);
            break;
        }
        break;

    case 4:
        // whitespace between tag and attribute
        if (*cp <= 0x20) //whitespace
            break;

        switch (*cp)
        {
        case '>':
            beginTagDone();
            mState = 1;
            break;
        default:
            *(mParseP++) = CASELESS(*cp);
            mState = 5;
            break;
        }
```

```
            break;

        case 5:
            // attribute
            if (*cp <= 0x20) //whitespace
            {
                attribute();
                mState = 8;
                break;
            }

            switch (*cp)
            {
            case '=':
                mState = 6;
                break;
            case '\"':
                attribute();
                mState = 7;
                break;
            case '>':
                beginTagDone();
                mParseP = mParseBuf;
                mState = 1;
                break;
            default:
                *(mParseP++) = CASELESS(*cp);
                break;
            }
            break;

        case 6:
            // =
            if (*cp <= 0x20) //whitespace
                break;

            switch (*cp)
            {
            case '\"':
                attribute();
                mState = 7;
                break;
            case '>':
                beginTagDone();
                mState = 1;
                break;
            default:
                attribute();
                *(mValueP++) = *cp;
                mState = 9;
                break;
            }
            break;

        case 7:
            // value
            if (*cp <= 0x20) //whitespace
            {
                if (!mLastValueSpace)
                {
                    *(mValueP++) = ' ';
                    mLastValueSpace = true;
                }
                break;
            }
            switch (*cp)
            {
            case '\"':
                value();
                mState = 4;
                break;
            default:
                mLastValueSpace = false;
                *(mValueP++) = *cp;
                break;
```

```
            }
            break;
        case 8:
            // whitespace between attr and =
            if (*cp <= 0x20) //whitespace
                break;

            switch (*cp)
            {
            case '>':
                beginTagDone();
                mState = 1;
                break;
            case '=':
                mState = 6;
                break;
            }
            break;

        case 9:
            // =
            if (*cp <= 0x20) //whitespace
            {
                value();
                mState = 4;
                break;
            }

            switch (*cp)
            {
            case '>':
                value();
                beginTagDone();
                mState = 1;
                break;
            default:
                *(mValueP++) = *cp;
                break;
            }
            break;

        case 10:
            // end tag begin
            if (*cp <= 0x20) //whitespace
            {
                if (mParseP != mParseBuf)
                    charData();
                doEntity('<');
                *(mParseP++) = '/';
                *(mParseP++) = ' ';
                mLastCharDataSpace = true;
                mState = 1;
                break;
            }

            switch (*cp)
            {
            case '>':
                mState = 1;
                break;
            default:
                *(mParseP++) = CASELESS(*cp);
                mState = 11;
                break;
            }
            break;

        case 11:
            // end tag token
            if (*cp <= 0x20) //whitespace
            {
                endTag();
                mState = 12;
                break;
```

```
            }

            switch (*cp)
            {
            case '>':
                endTag();
                mState = 1;
                break;
            default:
                *(mParseP++) = CASELESS(*cp);
                break;
            }
            break;

        case 12:
            // end tag end
            if (*cp == '>')
                mState = 1;
            break;

        case 13:
            // &
            switch (*cp)
            {
            case '#':
                mState = 15;
                break;
            default:
                *(mParseP++) = *cp;
                mState = 14;
                break;
            }
            break;

        case 14:
            // character entity
            switch (*cp)
            {
            case ';':
                charEntity();
                mState = 1;
                break;
            default:
                *(mParseP++) = *cp;
                break;
            }
            break;

        case 15:
            // decimal/hex entity
            switch (*cp)
            {
            case 'x':
                mState = 17;
                break;
            default:
                *(mParseP++) = *cp;
                mState = 16;
                break;
            }
            break;

        case 16:
            // decimal entity
            switch (*cp)
            {
            case ';':
                decimalEntity();
                mState = 1;
                break;
            default:
                *(mParseP++) = *cp;
                break;
            }
            break;
```

```
        case 17:
            // hex entity
            switch (*cp)
            {
            case ';':
                hexEntity();
                mState = 1;
                break;
            default:
                *(mParseP++) = *cp;
                break;
            }
            break;
        case 18:
            // <!
            switch (*cp)
            {
            case '>':
                mState = 1;
                break;
            case '-':
                mState = 19;
                break;
            default:
                mState = 12;
                break;
            }
            break;
        case 19:
            // <!-
            switch (*cp)
            {
            case '>':
                mState = 1;
                break;
            case '-':
                mState = 20;
                break;
            default:
                mState = 12;
                break;
            }
            break;
        case 20:
            // comment body
            if (*cp == '-')
                mState = 21;
            break;
        case 21:
            // -
            if (*cp == '-')
                mState = 22;
            else
                mState = 20;
            break;
        case 22:
            // --
            if (*cp == '>')
                mState = 1;
            else
                mState = 20;
            break;
        }

        if (mParseP - mParseBuf == kParseBufSize - 5) // 5 accounts for possible entity
at end
            charData();
        }
    }

    if (final)
        endDocument();
}
```

```
*/
// BLTokenTable.cpp

#include "BLTokenTable.h"

BLTokenTable::BLTokenTable()
: ACE_Hash_Map_Manager<const char*, int, ACE_Null_Mutex>(1009)
{
}

BLTokenTable::~BLTokenTable()
{
    for (iterator i = begin();
         i != end();
         i++)
    {
        char *str = (char*) (*i).ext_id_;
        delete[] str;
    }
}
// BLTransformDefs.cpp

#include "BLDocTransformer.h"
#include "BLImageTransformer.h"

BLDocTransformerFactory docTransformer;
BLImageTransformerFactory imgConv;

BLTransformationFactory* BLTransformManager::sFactoryDefs[] =
{
    &docTransformer,
    &imgConv,
    NULL
};
// BLTransformManager.cpp

#include "BLTransformManager.h"
#include "ace/OS.h"
#include "BLTransformation.h"
#include "BLClientInfo.h"
       .
       .
#include "ace/Hash_Map_Manager.h"
#include "ace/Synch.h"

class BLTrivialTransformer : public BLTransformation
{
public:

    BLTrivialTransformer(BLTransformManager::ContentType fromType,
        BLTransformManager::ContentType toType, BLTransportStream *streamP)
        : BLTransformation(fromType, toType), mTransportStreamP(streamP) {}

    virtual BLTransportStream* getTransportStream()
    {
        return mTransportStreamP;
    }

private:

    BLTransportStream *mTransportStreamP;
};


BLTransformManager* BLTransformManager::sInstanceP = NULL;

BLTransformManager*
BLTransformManager::instance()
{
    if (sInstanceP == NULL)
        sInstanceP = new BLTransformManager();

    return sInstanceP;
}
```

```
BLTransformManager::BLTransformManager()
{
    ACE_OS::memset(mContentStrings, 0, sizeof(char*) * kNumContentTypes);
}

BLTransformManager::~BLTransformManager()
{
}

int
BLTransformManager::initialize()
{

    ACE_NEW_RETURN(mContentMapP, ContentMap, -1);

    setContentTypeString(kHTMLType, "text/html");
    setContentTypeString(kWMLType, "text/vnd.wap.wml");
    setContentTypeString(kWMLCType, "text/vnd.wap.wmlc");
    setContentTypeString(kJPEGType, "image/jpeg");
    setContentTypeString(kGIFType, "image/gif");
    setContentTypeString(kPNGType, "image/png");
    setContentTypeString(kWBMPType, "image/vnd.wap.wbmp");
    setContentTypeString(kPalmBMPType, "image/vnd.palm.pbmp");
    setContentTypeString(kFormUrlEncodedType, "application/x-www-form-urlencoded");

    for (BLTransformationFactory** factoryP = sFactoryDefs;
         *factoryP != NULL;
         factoryP++)
    {
        if ((*factoryP)->initialize(this) < 0)
        {
            return -1;
        }
    }

    return 0;
}

void
BLTransformManager::finalize()
{
    delete mContentMapP;

    for (BLTransformationFactory** factoryP = sFactoryDefs;
         *factoryP != NULL;
         factoryP++)
    {
        (*factoryP)->finalize();
    }
}

void
BLTransformManager::registerTransformation(ContentType fromType,
                                           ContentType toType,
                                           BLTransformationFactory *factoryP)

{
    if (fromType >= 0 && fromType < kNumContentTypes)
    {
        ContentPair pair;
        pair.first = toType;
        pair.second = factoryP;
        mTransformationTable[fromType].push_back(pair);
    }
}

BLTransformation*
BLTransformManager::getTransformation(BLClientInfo *infoP,
                                      char* fromType,
                                      BLTransportStream *streamP)

{
    return getTransformation(infoP,
                             stringToContentType(fromType),
                             streamP);
}
```

```
BLTransformation*
BLTransformManager::getTransformation(BLClientInfo *infoP,
                                      ContentType fromType,
                                      BLTransportStream *streamP)
{
    if (fromType >= 0 && fromType < kNumContentTypes)
    {
        std::vector<ContentType>* types = infoP->getAcceptTypes();

        for (std::vector<ContentPair>::iterator i = mTransformationTable[fromType].begin();
             i != mTransformationTable[fromType].end();
             i++)
        {
            for (std::vector<ContentType>::iterator j = types->begin();
                 j != types->end();
                 j++)
            {
                if (*j == i->first)
                {
                    return i->second->makeTransformation(fromType, i->first, infoP, streamP);
                }
            }
        }

        for (std::vector<ContentType>::iterator j = types->begin();
             j != types->end(); j++)
        {
            if (*j == fromType)
            {
                return new BLTrivialTransformer(fromType, fromType, streamP);
            }
        }

    }

    return NULL;
}

BLTransformManager::ContentType
BLTransformManager::stringToContentType(char *str)
{
    if (str != NULL)
    {
        ACE_Hash_Map_Entry<const char*, ContentType> *entry;
        char *cp = ACE_OS::strchr(str, ';');

        if (cp == NULL) // no semi-colon
        {
            if(mContentMapP->find(str, entry) == 0)
                return entry->int_id_;
        }
        else // semi-colon
        {
            char *typeCopy;
            int len = cp - str;
            ACE_NEW_RETURN(typeCopy,
                           char [len + 1],
                           kUnknownType);
            ACE_OS::strncpy(typeCopy, str, len);
            typeCopy[len] = '\0';

            int err = mContentMapP->find(typeCopy, entry);
            delete[] typeCopy;

            if (err == 0)
                return entry->int_id_;
        }
    }

    return kUnknownType;
}

const char*
BLTransformManager::contentTypeToString(ContentType type)
{
```

```
    if (type >=0 && type < kNumContentTypes)
        return mContentStrings[type];
    return NULL;
}

void
BLTransformManager::setContentTypeString(ContentType type, char *str)
{
    mContentStrings[type] = str;
    mContentMapP->bind(str, type);
}
// BLWbxmlOutput.cpp

#include "BLWbxmlOutput.h"
#include "BLDocType.h"

BLWbxmlTable::BLWbxmlTable()
: mElementTable(NULL),
  mAttributeTable(NULL),
  mValueTable(NULL)
{
}

BLWbxmlTable::~BLWbxmlTable()
{
    delete[] mElementTable;
    delete[] mAttributeTable;
    delete[] mValueTable;
}

inline unsigned char
BLWbxmlTable::getElementTok(int elemTok)
{
    return mElementTable[elemTok];
}

inline unsigned char
BLWbxmlTable::getDefaultTok(int attrTok)
{
    return mAttributeTable[attrTok].mDefaultTok;
}

inline unsigned char
BLWbxmlTable::getValueTok(int valueTok)
{
    return mValueTable[valueTok];
}

inline BLWbxmlTable::TokVector*
BLWbxmlTable::getAttrToks(int attrTok)
{
    return &mAttributeTable[attrTok].mTokVector;
}

BLWbxmlOutput::BLWbxmlOutput(BLTransportStream *transportP, BLWbxmlTable *tableP,
BLTransformManager::ContentType type)
: mStream(transportP),
  mTransportP(transportP),
  mTableP(tableP),
  mContentType(type)
{
}

int
BLWbxmlOutput::beginDoc(BLDocType *docTypeP)
{
    mDocTypeP = docTypeP;
    mTransportP->init(BLTransportStream::kUnknownLength, mContentType);

    mStream << (char) 0x2;
    mStream << (char) 0x8;
    mStream << (char) 0x6A;
    mStream << (char) 0x0;
```

```
    return 0;
}

int
BLWbxmlOutput::endDoc()
{
    mStream.flush();
    return 0;
}

int
BLWbxmlOutput::charData(const char* data, int length)
{
    if (!mInCData)
    {
        mInCData = true;
        mStream << '\03';
    }

    mStream.write(data, length);
    return 0;
}

int
BLWbxmlOutput::beginElement(BLElement *elemP)
{
    if (mInCData)
    {
        mInCData = false;
        mStream << '\0';
    }

    unsigned char tok = mTableP->getElementTok(elemP->getTok());
    if (tok != 0)
    {
        if (!elemP->isEmpty())
            tok |= 0x40;

        BLElement::AttrVector *attrsP = elemP->getAttrVector();
        if (attrsP->size() > 0)
        {
            tok |= 0x80;
            mStream << tok;

            for (BLElement::AttrVector::iterator i = attrsP->begin();
                 i != attrsP->end();
                 i++)
            {
                writeAttr(&(*i));
            }
            mStream << '\01';
        }
        else
        {
            mStream << tok;
        }
    }
    return 0;
}

int
BLWbxmlOutput::endElement(int /*elemTok*/)
{
    if (mInCData)
    {
        mInCData = false;
        mStream << '\0';
    }
    mStream << '\01';

    return 0;
}

void
BLWbxmlOutput::writeAttr(BLAttribute *attrP)
```

```
{
    BLWbxmlTable::TokVector *toksP = mTableP->getAttrToks(attrP->getTok());
    for (BLWbxmlTable::TokVector::iterator i = toksP->begin();
         i != toksP->end();
         i++)
    {
        int index;
        if (i->second.getType() == attrP->getType())
        {
            switch (attrP->getType())
            {
            case BLAttribute::kCDataType:
                {
                    char *defCData = i->second.getCDataValue();
                    char *attrCData = attrP->getCDataValue();
                    index = 0;
                    while (true)
                    {
                        if (defCData[index] == '\0')
                        {
                            mStream << i->first;
                            if (attrCData[index] != '\0')
                            {
                                mStream << '\03';
                                mStream << (attrCData + index);
                                mStream << '\0';
                            }
                            return;
                        }
                        if (defCData[index] != attrCData[index])
                            break;
                        index++;
                    }
                }
                break;
            case BLAttribute::kTokType:
                if (attrP->getTokValue() == i->second.getTokValue())
                {
                    mStream << i->first;
                    return;
                }
                break;
            case BLAttribute::kBoolType:
                if (attrP->getBoolValue() == i->second.getBoolValue())
                {
                    mStream << i->first;
                    return;
                }
                break;
            }
        }
    }

    int defaultTok = mTableP->getDefaultTok(attrP->getTok());
    if (defaultTok != 0)
    {
        switch (attrP->getType())
        {
        case BLAttribute::kCDataType:
            mStream << defaultTok;
            mStream << '\03';
            mStream << attrP->getCDataValue();
            mStream << '\0';
            break;
        case BLAttribute::kIntType:
            mStream << defaultTok;
            mStream << '\03';
            mStream << attrP->getIntValue();
            mStream << '\0';
            break;
        case BLAttribute::kLengthType:
            mStream << defaultTok;
            mStream << '\03';
            {
                int intValue = attrP->getIntValue();
```

```
            if (intValue >= 0)
                mStream << intValue;
            else
                mStream << -intValue << '%';
        }
        mStream << '\0';
        break;
    case BLAttribute::kTokType:
        {
            mStream << defaultTok;

            unsigned char valueTok = mTableP->getValueTok(attrP->getTokValue());
            if (valueTok != 0)
            {
                mStream << valueTok;
            }
            else
            {
                mStream << '\03';
                    mStream << mDocTypeP->getValueString(attrP->getTokValue());
                mStream << '\0';
            }
        }
        break;
    }
  }
}
// BLWmlDocType.cpp

#include "BLWmlDocType.h"

// element classes
enum {
    kEmphClass      = 01,
    kLayoutClass    = 02,
    kTextClass      = 04,
    kFlowClass      = 010,
    kTaskClass      = 020,
    kNavElmtsClass = 040,
    kFieldsClass    = 0100,
};

BLWmlDocType::BLWmlDocType()
: BLDocType(kNumElements)
{
}

int
BLWmlDocType::initialize()
{
    if (initTables(kNumElements, kNumAttrs, kNumValues) < 0)
        return -1;

    initClasses();
    initElements();
    if (initPaths() < 0)
        return -1;

    initElementToks();
    initAttributeToks();
    initValueToks();
    initEntityToks();

    return 0;
}

void
BLWmlDocType::initClasses()
{
    // emph
    mElementDefs[kEmphasisElement] .addToClass(kEmphClass);
    mElementDefs[kStrongElement]        .addToClass(kEmphClass);
    mElementDefs[kBoldElement]          .addToClass(kEmphClass);
    mElementDefs[kItalicElement]        .addToClass(kEmphClass);
    mElementDefs[kUnderlineElement] .addToClass(kEmphClass);
```

```
    mElementDefs[kBigElement]           .addToClass(kEmphClass);
    mElementDefs[kSmallElement]     .addToClass(kEmphClass);

    // layout
    mElementDefs[kLinebreakElement].addToClass(kLayoutClass);

    // text
    mElementDefs[kCDataElement]     .addToClass(kTextClass);
    addClassToClass(kTextClass, kEmphClass);

    // flow
    mElementDefs[kImageElement]     .addToClass(kFlowClass);
    mElementDefs[kAnchorElement]        .addToClass(kFlowClass);
    mElementDefs[kAElement]             .addToClass(kFlowClass);
    mElementDefs[kTableElement]     .addToClass(kFlowClass);
    addClassToClass(kFlowClass, kTextClass);
    addClassToClass(kFlowClass, kLayoutClass);

    //task
    mElementDefs[kGoElement]            .addToClass(kTaskClass);
    mElementDefs[kPrevElement]          .addToClass(kTaskClass);
    mElementDefs[kNoopElement]          .addToClass(kTaskClass);
    mElementDefs[kRefreshElement]       .addToClass(kTaskClass);

    // navelmts
    mElementDefs[kDoElement]            .addToClass(kNavElmtsClass);
    mElementDefs[kOnEventElement]       .addToClass(kNavElmtsClass);

    //fields
    mElementDefs[kInputElement]     .addToClass(kFieldsClass);
    mElementDefs[kSelectElement]        .addToClass(kFieldsClass);
    mElementDefs[kFieldSetElement] .addToClass(kFieldsClass);
    addClassToClass(kFieldsClass, kFlowClass);
}

void
BLWmlDocType::initElements()
{
    // attributes
    BLAttributeDef *cdataNameImp        = makeAttrDef(kNameAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *cdataNameReq        = makeAttrDef(kNameAttr, BLAttribute::kCDataType,
true);
    BLAttributeDef *title               = makeAttrDef(kTitleAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *newContext          = makeAttrDef(kNewContextAttr,
BLAttribute::kBoolType, false);
    BLAttributeDef *ordered             = makeAttrDef(kOrderedAttr, BLAttribute::kBoolType,
false);
    BLAttributeDef *onEnterForward = makeAttrDef(kOnEnterForwardAttr,
BLAttribute::kCDataType, false);
    BLAttributeDef *onEnterBackward= makeAttrDef(kOnEnterBackwardAttr,
BLAttribute::kCDataType, false);
    BLAttributeDef *onTimer             = makeAttrDef(kOnTimerAttr, BLAttribute::kCDataTy
false);
    BLAttributeDef *label               = makeAttrDef(kLabelAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *optional            = makeAttrDef(kOptionalAttr, BLAttribute::kBoolType,
false);
    BLAttributeDef *type                    = makeAttrDef(kTypeAttr, BLAttribute::kCDataType,
true);
    BLAttributeDef *doType              = makeAttrDef(kTypeAttr, BLAttribute::kTokType,
true);
    doType->addValueTok(kAcceptValue);
    doType->addValueTok(kPrevValue);
    doType->addValueTok(kHelpValue);
    doType->addValueTok(kResetValue);
    doType->addValueTok(kOptionsValue);
    doType->addValueTok(kDeleteValue);
    doType->addValueTok(kUnknownValue);
    BLAttributeDef *oneventType     = makeAttrDef(kTypeAttr, BLAttribute::kTokType, true);
    oneventType->addValueTok(kAcceptValue);
    oneventType->addValueTok(kDeleteValue);
    oneventType->addValueTok(kHelpValue);
    oneventType->addValueTok(kPasswordValue);
```

```
    oneventType->addValueTok(kOnPickValue);
    oneventType->addValueTok(kOnEnterForwardValue);
    oneventType->addValueTok(kOnEnterBackwardValue);
    oneventType->addValueTok(kOnTimerValue);
    BLAttributeDef *httpEquiv           = makeAttrDef(kHttpEquivAttr,
BLAttribute::kCDataType, false);
    BLAttributeDef *forua               = makeAttrDef(kForuaAttr, BLAttribute::kBoolType,
false);
    BLAttributeDef *content             = makeAttrDef(kContentAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *scheme              = makeAttrDef(kSchemeAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *href                     = makeAttrDef(kHrefAttr, BLAttribute::kCDataType,
true);
    BLAttributeDef *sendReferer    = makeAttrDef(kSendRefererAttr, BLAttribute::kBoolType,
false);
    BLAttributeDef *method              = makeAttrDef(kMethodAttr, BLAttribute::kTokType,
false);
    method->addValueTok(kGetValue);
    method->addValueTok(kPostValue);
    BLAttributeDef *encType             = makeAttrDef(kEncTypeAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *acceptCharset       = makeAttrDef(kAcceptCharsetAttr,
BLAttribute::kCDataType, false);
    BLAttributeDef *valueImp            = makeAttrDef(kValueAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *valueReq            = makeAttrDef(kValueAttr, BLAttribute::kCDataType,
true);
    BLAttributeDef *iname               = makeAttrDef(kINameAttr, BLAttribute::kIntType,
false);
    BLAttributeDef *ivalue              = makeAttrDef(kIValueAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *multiple            = makeAttrDef(kMultipleAttr, BLAttribute::kBoolType,
false);
    BLAttributeDef *tabindex            = makeAttrDef(kTabIndexAttr, BLAttribute::kIntType,
false);
    BLAttributeDef *onpick              = makeAttrDef(kOnPickAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *inputType           = makeAttrDef(kTypeAttr, BLAttribute::kTokType,
false);
    inputType->addValueTok(kTextValue);
    inputType->addValueTok(kPasswordValue);
    BLAttributeDef *format              = makeAttrDef(kFormatAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *emptyok             = makeAttrDef(kEmptyokAttr, BLAttribute::kBoolType,
false);
    BLAttributeDef *size                     = makeAttrDef(kSizeAttr, BLAttribute::kIntType,
false);
    BLAttributeDef *maxLength           = makeAttrDef(kMaxLengthAttr, BLAttribute::kIntType,
false);
    BLAttributeDef *acessKey            = makeAttrDef(kAccessKeyAttr,
BLAttribute::kCDataType, false);
    BLAttributeDef *alt                 = makeAttrDef(kAltAttr, BLAttribute::kCDataType,
true);
    BLAttributeDef *src                 = makeAttrDef(kSrcAttr, BLAttribute::kCDataType,
true);
    BLAttributeDef *localsrc            = makeAttrDef(kLocalSrcAttr, BLAttribute::kCDataType,
false);
    BLAttributeDef *vspace              = makeAttrDef(kVspaceAttr, BLAttribute::kLengthType,
false);
    BLAttributeDef *hspace              = makeAttrDef(kHspaceAttr, BLAttribute::kLengthType,
false);
    BLAttributeDef *ialign              = makeAttrDef(kAlignAttr, BLAttribute::kTokType,
false);
    ialign->addValueTok(kTopValue);
    ialign->addValueTok(kMiddleValue);
    ialign->addValueTok(kBottomValue);
    BLAttributeDef *height              = makeAttrDef(kHeightAttr, BLAttribute::kLengthType,
false);
    BLAttributeDef *width               = makeAttrDef(kWidthAttr, BLAttribute::kLengthType,
false);
    BLAttributeDef *talign              = makeAttrDef(kAlignAttr, BLAttribute::kTokType,
false);
    talign->addValueTok(kLeftValue);
    talign->addValueTok(kCenterValue);
```

```
    talign->addValueTok(kRightValue);
    BLAttributeDef *columns             = makeAttrDef(kColumnsAttr, BLAttribute::kIntType,
true);
    BLAttributeDef *mode                     = makeAttrDef(kModeAttr, BLAttribute::kTokType,
false);
    mode->addValueTok(kWrapValue);
    mode->addValueTok(kNoWrapValue);
    BLAttributeDef *cdata               = makeAttrDef(kCDataAttr, BLAttribute::kCDataType,
true);
    BLAttributeDef *entity              = makeAttrDef(kEntityAttr, BLAttribute::kIntType,
true);
    BLAttributeDef *id                  = makeAttrDef(kIDAttr, BLAttribute::kCDataType,
false);

    // wml
    mElementDefs[kWmlElement].addElement(&mElementDefs[kHeadElement]);
    mElementDefs[kWmlElement].addElement(&mElementDefs[kTemplateElement]);
    mElementDefs[kWmlElement].addElement(&mElementDefs[kCardElement]);
    mElementDefs[kWmlElement].setResetWhitespace();
    //mElementDefs[kWmlElement].setEmptyOK(false);
    //card
    mElementDefs[kCardElement].addElement(&mElementDefs[kOnEventElement]);
    mElementDefs[kCardElement].addElement(&mElementDefs[kTimerElement]);
    mElementDefs[kCardElement].addElement(&mElementDefs[kDoElement]);
    mElementDefs[kCardElement].addElement(&mElementDefs[kParagraphElement]);
    mElementDefs[kCardElement].addElement(&mElementDefs[kPreElement]);
    mElementDefs[kCardElement].addAttribute(title);
    mElementDefs[kCardElement].addAttribute(newContext);
    mElementDefs[kCardElement].addAttribute(ordered);
    mElementDefs[kCardElement].addAttribute(onEnterForward);
    mElementDefs[kCardElement].addAttribute(onEnterBackward);
    mElementDefs[kCardElement].addAttribute(onTimer);
    mElementDefs[kCardElement].setResetWhitespace();
    // do
    addClassToElem(kDoElement, kTaskClass);
    mElementDefs[kDoElement].addAttribute(doType);
    mElementDefs[kDoElement].addAttribute(label);
    mElementDefs[kDoElement].addAttribute(cdataNameImp);
    mElementDefs[kDoElement].addAttribute(optional);
    mElementDefs[kDoElement].setEmptyOK(false);
    mElementDefs[kDoElement].setIgnoreWhitespace();
    // noop -- nothing to be done
    // onevent
    addClassToElem(kOnEventElement, kTaskClass);
    mElementDefs[kOnEventElement].addAttribute(oneventType);
    mElementDefs[kOnEventElement].setEmptyOK(false);
    // head
    mElementDefs[kHeadElement].addElement(&mElementDefs[kAccessElement]);
    mElementDefs[kHeadElement].addElement(&mElementDefs[kMetaElement]);
    mElementDefs[kHeadElement].setEmptyOK(false);
    mElementDefs[kHeadElement].setIgnoreWhitespace();
    // template
    addClassToElem(kTemplateElement, kNavElmtsClass);
    mElementDefs[kTemplateElement].addAttribute(onEnterForward);
    mElementDefs[kTemplateElement].addAttribute(onEnterBackward);
    mElementDefs[kTemplateElement].addAttribute(onTimer);
    mElementDefs[kTemplateElement].setIgnoreWhitespace();
    // access
    mElementDefs[kAccessElement].addAttribute(httpEquiv);
    mElementDefs[kAccessElement].addAttribute(cdataNameImp);
    mElementDefs[kAccessElement].addAttribute(forua);
    mElementDefs[kAccessElement].addAttribute(content);
    mElementDefs[kAccessElement].addAttribute(scheme);
    // go
    mElementDefs[kGoElement].addElement(&mElementDefs[kPostfieldElement]);
    mElementDefs[kGoElement].addElement(&mElementDefs[kSetVarElement]);
    mElementDefs[kGoElement].addAttribute(href);
    mElementDefs[kGoElement].addAttribute(sendReferer);
    mElementDefs[kGoElement].addAttribute(method);
    mElementDefs[kGoElement].addAttribute(encType);
    mElementDefs[kGoElement].addAttribute(acceptCharset);
    mElementDefs[kDoElement].setIgnoreWhitespace();
    // prev
    mElementDefs[kPrevElement].addElement(&mElementDefs[kSetVarElement]);
    // refresh
```

```
    mElementDefs[kRefreshElement].addElement(&mElementDefs[kSetVarElement]);
    // setvar
    mElementDefs[kSetVarElement].addAttribute(cdataNameReq);
    mElementDefs[kSetVarElement].addAttribute(valueReq);
    // select
    mElementDefs[kSelectElement].addElement(&mElementDefs[kOptGroupElement]);
    mElementDefs[kSelectElement].addElement(&mElementDefs[kOptionElement]);
    mElementDefs[kSelectElement].addAttribute(title);
    mElementDefs[kSelectElement].addAttribute(cdataNameImp);
    mElementDefs[kSelectElement].addAttribute(valueImp);
    mElementDefs[kSelectElement].addAttribute(iname);
    mElementDefs[kSelectElement].addAttribute(ivalue);
    mElementDefs[kSelectElement].addAttribute(multiple);
    mElementDefs[kSelectElement].addAttribute(tabindex);
    mElementDefs[kSelectElement].setEmptyOK(false);
    mElementDefs[kSelectElement].setIgnoreWhitespace();
    // optgroup
    mElementDefs[kOptGroupElement].addElement(&mElementDefs[kOptGroupElement]);
    mElementDefs[kOptGroupElement].addElement(&mElementDefs[kOptionElement]);
    mElementDefs[kOptGroupElement].addAttribute(title);
    mElementDefs[kOptGroupElement].setEmptyOK(false);
    mElementDefs[kOptGroupElement].setIgnoreWhitespace();
    // option
    mElementDefs[kOptionElement].addElement(&mElementDefs[kOnEventElement]);
    mElementDefs[kOptionElement].addElement(&mElementDefs[kCDataElement]);
    mElementDefs[kOptionElement].addAttribute(valueImp);
    mElementDefs[kOptionElement].addAttribute(title);
    mElementDefs[kOptionElement].addAttribute(onpick);
    mElementDefs[kOptionElement].setResetWhitespace();
    // input
    mElementDefs[kInputElement].addAttribute(cdataNameReq);
    mElementDefs[kInputElement].addAttribute(inputType);
    mElementDefs[kInputElement].addAttribute(valueImp);
    mElementDefs[kInputElement].addAttribute(format);
    mElementDefs[kInputElement].addAttribute(emptyok);
    mElementDefs[kInputElement].addAttribute(size);
    mElementDefs[kInputElement].addAttribute(maxLength);
    mElementDefs[kInputElement].addAttribute(tabindex);
    mElementDefs[kInputElement].addAttribute(title);
    mElementDefs[kInputElement].addAttribute(acessKey);
    // fieldset
    addClassToElem(kFieldSetElement, kFieldsClass);
    mElementDefs[kFieldSetElement].addElement(&mElementDefs[kDoElement]);
    mElementDefs[kFieldSetElement].addAttribute(title);
    mElementDefs[kFieldSetElement].setIgnoreWhitespace();
    // timer
    mElementDefs[kTimerElement].addAttribute(cdataNameImp);
    mElementDefs[kTimerElement].addAttribute(valueReq);
    // img
    mElementDefs[kImageElement].addAttribute(alt);
    mElementDefs[kImageElement].addAttribute(src);
    mElementDefs[kImageElement].addAttribute(localsrc);
    mElementDefs[kImageElement].addAttribute(vspace);
    mElementDefs[kImageElement].addAttribute(hspace);
    mElementDefs[kImageElement].addAttribute(ialign);
    mElementDefs[kImageElement].addAttribute(height);
    mElementDefs[kImageElement].addAttribute(width);
    // anchor
    mElementDefs[kAnchorElement].addElement(&mElementDefs[kCDataElement]);
    mElementDefs[kAnchorElement].addElement(&mElementDefs[kLinebreakElement]);
    mElementDefs[kAnchorElement].addElement(&mElementDefs[kImageElement]);
    mElementDefs[kAnchorElement].addElement(&mElementDefs[kGoElement]);
    mElementDefs[kAnchorElement].addElement(&mElementDefs[kPrevElement]);
    mElementDefs[kAnchorElement].addElement(&mElementDefs[kRefreshElement]);
    mElementDefs[kAnchorElement].addAttribute(title);
    mElementDefs[kAnchorElement].addAttribute(acessKey);
    // a
    mElementDefs[kAElement].addElement(&mElementDefs[kCDataElement]);
    mElementDefs[kAElement].addElement(&mElementDefs[kLinebreakElement]);
    mElementDefs[kAElement].addElement(&mElementDefs[kImageElement]);
    mElementDefs[kAElement].addAttribute(href);
    mElementDefs[kAElement].addAttribute(title);
    // table
    mElementDefs[kTableElement].addElement(&mElementDefs[kTableRowElement]);
    mElementDefs[kTableElement].addAttribute(title);
```

```
    mElementDefs[kTableElement].addAttribute(talign);
    mElementDefs[kTableElement].addAttribute(columns);
    mElementDefs[kTableElement].setNewContext();
    mElementDefs[kTableElement].setEmptyOK(false);
    mElementDefs[kTableElement].setIgnoreWhitespace();
    // tr
    mElementDefs[kTableRowElement].addElement(&mElementDefs[kTableDataElement]);
    mElementDefs[kTableRowElement].setHardClose();
    mElementDefs[kTableRowElement].setEmptyOK(false);
    mElementDefs[kTableRowElement].setIgnoreWhitespace();
    // td
    addClassToElem(kTableDataElement, kTextClass);
    mElementDefs[kTableDataElement].addElement(&mElementDefs[kImageElement]);
    mElementDefs[kTableDataElement].addElement(&mElementDefs[kAnchorElement]);
    mElementDefs[kTableDataElement].addElement(&mElementDefs[kAElement]);
    mElementDefs[kTableDataElement].setHardClose();
    mElementDefs[kTableDataElement].setResetWhitespace();
    // em
    addClassToElem(kEmphasisElement, kFlowClass);
    // strong
    addClassToElem(kStrongElement, kFlowClass);
    // b
    addClassToElem(kBoldElement, kFlowClass);
    // i
    addClassToElem(kItalicElement, kFlowClass);
    // u
    addClassToElem(kUnderlineElement, kFlowClass);
    // big
    addClassToElem(kBigElement, kFlowClass);
    // small
    addClassToElem(kSmallElement, kFlowClass);
    // p
    addClassToElem(kParagraphElement, kFieldsClass);
    mElementDefs[kParagraphElement].addElement(&mElementDefs[kDoElement]);
    mElementDefs[kParagraphElement].addAttribute(talign);
    mElementDefs[kParagraphElement].addAttribute(mode);
    mElementDefs[kParagraphElement].setEmptyOK(false);
    mElementDefs[kParagraphElement].setResetWhitespace();
    // br -- nothing to be done
    mElementDefs[kLinebreakElement].setResetWhitespace();
    // pre
    mElementDefs[kPreElement].addElement(&mElementDefs[kCDataElement]);
    mElementDefs[kPreElement].addElement(&mElementDefs[kAElement]);
    mElementDefs[kPreElement].addElement(&mElementDefs[kLinebreakElement]);
    mElementDefs[kPreElement].addElement(&mElementDefs[kImageElement]);
    mElementDefs[kPreElement].addElement(&mElementDefs[kBoldElement]);
    mElementDefs[kPreElement].addElement(&mElementDefs[kEmphasisElement]);
    mElementDefs[kPreElement].addElement(&mElementDefs[kStrongElement]);
    mElementDefs[kPreElement].addElement(&mElementDefs[kInputElement]);
    mElementDefs[kPreElement].addElement(&mElementDefs[kSelectElement]);
    mElementDefs[kPreElement].setEmptyOK(false);
    mElementDefs[kPreElement].setPreserveWhitespace();

    // all
    for (int i=0; i<kNumElements; i++)
        mElementDefs[i].addAttribute(id);
}

void
BLWmlDocType::initElementToks()
{
    addElementTok("wml", kWmlElement);
    addElementTok("card", kCardElement);
    addElementTok("do", kDoElement);
    addElementTok("onevent", kOnEventElement);
    addElementTok("head", kHeadElement);
    addElementTok("template", kTemplateElement);
    addElementTok("access", kAccessElement);
    addElementTok("meta", kMetaElement);
    addElementTok("go", kGoElement);
    addElementTok("prev", kPrevElement);
    addElementTok("refresh", kRefreshElement);
    addElementTok("noop", kNoopElement);
    addElementTok("postfield", kPostfieldElement);
    addElementTok("setvar", kSetVarElement);
```

```
    addElementTok("select", kSelectElement);
    addElementTok("optgroup", kOptGroupElement);
    addElementTok("option", kOptionElement);
    addElementTok("input", kInputElement);
    addElementTok("fieldset", kFieldSetElement);
    addElementTok("timer", kTimerElement);
    addElementTok("img", kImageElement);
    addElementTok("anchor", kAnchorElement);
    addElementTok("a", kAElement);
    addElementTok("table", kTableElement);
    addElementTok("tr", kTableRowElement);
    addElementTok("td", kTableDataElement);
    addElementTok("em", kEmphasisElement);
    addElementTok("strong", kStrongElement);
    addElementTok("b", kBoldElement);
    addElementTok("i", kItalicElement);
    addElementTok("u", kUnderlineElement);
    addElementTok("big", kBigElement);
    addElementTok("small", kSmallElement);
    addElementTok("p", kParagraphElement);
    addElementTok("br", kLinebreakElement);
    addElementTok("pre", kPreElement);
}

void
BLWmlDocType::initAttributeToks()
{
    addAttributeTok("href", kHrefAttr);
    addAttributeTok("name", kNameAttr);
    addAttributeTok("value", kValueAttr);
    addAttributeTok("align", kAlignAttr);
    addAttributeTok("src", kSrcAttr);
    addAttributeTok("localsrc", kLocalSrcAttr);
    addAttributeTok("alt", kAltAttr);
    addAttributeTok("vspace", kVspaceAttr);
    addAttributeTok("hspace", kHspaceAttr);
    addAttributeTok("height", kHeightAttr);
    addAttributeTok("width", kWidthAttr);
    addAttributeTok("title", kTitleAttr);
    addAttributeTok("newcontext", kNewContextAttr);
    addAttributeTok("ordered", kOrderedAttr);
    addAttributeTok("onenterforward", kOnEnterForwardAttr);
    addAttributeTok("onenterbackward", kOnEnterBackwardAttr);
    addAttributeTok("ontimer", kOnTimerAttr);
    addAttributeTok("type", kTypeAttr);
    addAttributeTok("domain", kDomainAttr);
    addAttributeTok("path", kPathAttr);
    addAttributeTok("http-equiv", kHttpEquivAttr);
    addAttributeTok("forua", kForuaAttr);
    addAttributeTok("content", kContentAttr);
    addAttributeTok("scheme", kSchemeAttr);
    addAttributeTok("sendreferer", kSendRefererAttr);
    addAttributeTok("method", kMethodAttr);
    addAttributeTok("enctype", kEncTypeAttr);
    addAttributeTok("accept-charset", kAcceptCharsetAttr);
    addAttributeTok("iname", kINameAttr);
    addAttributeTok("ivalue", kIValueAttr);
    addAttributeTok("multiple", kMultipleAttr);
    addAttributeTok("tabindex", kTabIndexAttr);
    addAttributeTok("onpick", kOnPickAttr);
    addAttributeTok("format", kFormatAttr);
    addAttributeTok("emptyok", kEmptyokAttr);
    addAttributeTok("size", kSizeAttr);
    addAttributeTok("maxlength", kMaxLengthAttr);
    addAttributeTok("accesskey", kAccessKeyAttr);
    addAttributeTok("columns", kColumnsAttr);
    addAttributeTok("label", kLabelAttr);
    addAttributeTok("optional", kOptionalAttr);
    addAttributeTok("mode", kModeAttr);
    addAttributeTok("id", kIDAttr);
}

void
BLWmlDocType::initValueToks()
{
```

```
    addValueTok("left", kLeftValue);
    addValueTok("center", kCenterValue);
    addValueTok("right", kRightValue);
    addValueTok("top", kTopValue);
    addValueTok("middle", kMiddleValue);
    addValueTok("bottom", kBottomValue);
    addValueTok("accept", kAcceptValue);
    addValueTok("delete", kDeleteValue);
    addValueTok("help", kHelpValue);
    addValueTok("password", kPasswordValue);
    addValueTok("onpick", kOnPickValue);
    addValueTok("onenterbackward", kOnEnterBackwardValue);
    addValueTok("onenterforward", kOnEnterForwardValue);
    addValueTok("ontimer", kOnTimerValue);
    addValueTok("options", kOptionsValue);
    addValueTok("prev", kPrevValue);
    addValueTok("reset", kResetValue);
    addValueTok("text", kTextValue);
    addValueTok("unknown", kUnknownValue);
}

void
BLWmlDocType::initEntityToks()
{
    addEntityTok("quot", 34);
    addEntityTok("amp", 38);
    addEntityTok("apos", 39);
    addEntityTok("lt", 60);
    addEntityTok("gt", 62);
    addEntityTok("nbsp", 160);
    addEntityTok("shy", 173);
}

const char*
BLWmlDocType::getDocTypeString()
{
    return "<!DOCTYPE wml PUBLIC \"-//WAPFORUM//DTD WML 1.1//EN\"
\"http://www.wapforum.org/DTD/wml_1.1.xml\">";
}

BLElementDef*
BLWmlDocType::getRootElemDef()
{
    return getElementDef(kWmlElement);
}// BLWmlcTable.cpp

#include "BLWmlcTable.h"
#include "BLWmlDocType.h"

int
BLWmlcTable::initialize()
{
    if (makeElementTable() < 0 ||
        makeAttributeTable() < 0 ||
        makeValueTable() < 0)
        return -1;

    return 0;
}

int
BLWmlcTable::makeElementTable()
{
    ACE_NEW_RETURN(mElementTable,
                   unsigned char[BLWmlDocType::kNumElements],
                   -1);

    ACE_OS::memset(mElementTable, 0, BLWmlDocType::kNumElements * sizeof(unsigned char));

    mElementTable[BLWmlDocType::kWmlElement]              = 0x3F;
    mElementTable[BLWmlDocType::kCardElement]             = 0x27;
    mElementTable[BLWmlDocType::kDoElement]               = 0x28;
    mElementTable[BLWmlDocType::kOnEventElement]          = 0x33;
    mElementTable[BLWmlDocType::kHeadElement]             = 0x2C;
    mElementTable[BLWmlDocType::kTemplateElement]     = 0x3B;
```

```
    mElementTable[BLWmlDocType::kAccessElement]             = 0x23;
    mElementTable[BLWmlDocType::kMetaElement]               = 0x30;
    mElementTable[BLWmlDocType::kGoElement]                 = 0x2B;
    mElementTable[BLWmlDocType::kPrevElement]               = 0x32;
    mElementTable[BLWmlDocType::kRefreshElement]            = 0x36;
    mElementTable[BLWmlDocType::kNoopElement]               = 0x31;
    mElementTable[BLWmlDocType::kPostfieldElement]      = 0x21;
    mElementTable[BLWmlDocType::kSetVarElement]              = 0x3E;
    mElementTable[BLWmlDocType::kSelectElement]              = 0x37;
    mElementTable[BLWmlDocType::kOptGroupElement]       = 0x34;
    mElementTable[BLWmlDocType::kOptionElement]              = 0x35;
    mElementTable[BLWmlDocType::kInputElement]          = 0x2F;
    mElementTable[BLWmlDocType::kFieldSetElement]       = 0x2A;
    mElementTable[BLWmlDocType::kTimerElement]          = 0x3C;
    mElementTable[BLWmlDocType::kImageElement]          = 0x2E;
    mElementTable[BLWmlDocType::kAnchorElement]              = 0x22;
    mElementTable[BLWmlDocType::kAElement]                   = 0x1C;
    mElementTable[BLWmlDocType::kTableElement]          = 0x1F;
    mElementTable[BLWmlDocType::kTableRowElement]       = 0x1E;
    mElementTable[BLWmlDocType::kTableDataElement]      = 0x1D;
    mElementTable[BLWmlDocType::kEmphasisElement]       = 0x29;
    mElementTable[BLWmlDocType::kStrongElement]              = 0x39;
    mElementTable[BLWmlDocType::kBoldElement]                = 0x24;
    mElementTable[BLWmlDocType::kItalicElement]              = 0x2D;
    mElementTable[BLWmlDocType::kUnderlineElement]      = 0x3D;
    mElementTable[BLWmlDocType::kBigElement]                 = 0x25;
    mElementTable[BLWmlDocType::kSmallElement]          = 0x38;
    mElementTable[BLWmlDocType::kParagraphElement]      = 0x20;
    mElementTable[BLWmlDocType::kLinebreakElement]      = 0x26;
    mElementTable[BLWmlDocType::kPreElement]                 = 0x1B;

    return 0;
}

int
BLWmlcTable::makeValueTable()
{
    ACE_NEW_RETURN(mValueTable,
                   unsigned char[BLWmlDocType::kNumValues],
                   -1);
    ACE_OS::memset(mValueTable, 0, BLWmlDocType::kNumValues * sizeof(unsigned char));

    mValueTable[BLWmlDocType::kTopValue]            = 0x9E;
    mValueTable[BLWmlDocType::kMiddleValue]         = 0x93;
    mValueTable[BLWmlDocType::kBottomValue]         = 0x8A;
    mValueTable[BLWmlDocType::kWrapValue]           = 0xA0;
    mValueTable[BLWmlDocType::kNoWrapValue]         = 0x94;
    mValueTable[BLWmlDocType::kAcceptValue]         = 0x89;
    mValueTable[BLWmlDocType::kDeleteValue]         = 0x8C;
    mValueTable[BLWmlDocType::kHelpValue]           = 0x8D;
    mValueTable[BLWmlDocType::kPasswordValue]       = 0x9A;
    mValueTable[BLWmlDocType::kOnPickValue]         = 0x95;
    mValueTable[BLWmlDocType::kOnEnterBackwardValue] = 0x96;
    mValueTable[BLWmlDocType::kOnEnterForwardValue]    = 0x97;
    mValueTable[BLWmlDocType::kOnTimerValue]        = 0x98;
    mValueTable[BLWmlDocType::kOptionsValue]        = 0x99;
    mValueTable[BLWmlDocType::kResetValue]          = 0x9B;
    mValueTable[BLWmlDocType::kTextValue]           = 0x9D;
    mValueTable[BLWmlDocType::kUnknownValue]        = 0x9F;

    return 0;
}

int
BLWmlcTable::makeAttributeTable()
{
    ACE_NEW_RETURN(mAttributeTable,
                   AttrMap[BLWmlDocType::kNumAttrs],
                   -1);

    BLAttribute attr;

    // href
    mAttributeTable[BLWmlDocType::kHrefAttr].mDefaultTok = 0x4A;
    attr.setType(BLAttribute::kCDataType);
```

```
    attr.setCDataValue("http://");
    mAttributeTable[BLWmlDocType::kHrefAttr].mTokVector.push(&attr, 0x4B);
    attr.setCDataValue("https://");
    mAttributeTable[BLWmlDocType::kHrefAttr].mTokVector.push(&attr, 0x4C);
    // name
    mAttributeTable[BLWmlDocType::kNameAttr].mDefaultTok = 0x21;
    // value
    mAttributeTable[BLWmlDocType::kValueAttr].mDefaultTok = 0x4D;
    // align
    mAttributeTable[BLWmlDocType::kAlignAttr].mDefaultTok = 0x52;
    attr.setType(BLAttribute::kTokType);
    attr.setTokValue(BLWmlDocType::kBottomValue);
    mAttributeTable[BLWmlDocType::kAlignAttr].mTokVector.push(&attr, 0x6);
    attr.setTokValue(BLWmlDocType::kCenterValue);
    mAttributeTable[BLWmlDocType::kAlignAttr].mTokVector.push(&attr, 0x7);
    attr.setTokValue(BLWmlDocType::kLeftValue);
    mAttributeTable[BLWmlDocType::kAlignAttr].mTokVector.push(&attr, 0x8);
    attr.setTokValue(BLWmlDocType::kMiddleValue);
    mAttributeTable[BLWmlDocType::kAlignAttr].mTokVector.push(&attr, 0x9);
    attr.setTokValue(BLWmlDocType::kRightValue);
    mAttributeTable[BLWmlDocType::kAlignAttr].mTokVector.push(&attr, 0xA);
    attr.setTokValue(BLWmlDocType::kTopValue);
    mAttributeTable[BLWmlDocType::kAlignAttr].mTokVector.push(&attr, 0xB);
    // src
    mAttributeTable[BLWmlDocType::kSrcAttr].mDefaultTok = 0x32;
    attr.setType(BLAttribute::kCDataType);
    attr.setCDataValue("http://");
    mAttributeTable[BLWmlDocType::kSrcAttr].mTokVector.push(&attr, 0x58);
    attr.setCDataValue("https://");
    mAttributeTable[BLWmlDocType::kSrcAttr].mTokVector.push(&attr, 0x59);
    // localsrc
    mAttributeTable[BLWmlDocType::kLocalSrcAttr].mDefaultTok = 0x19;
    // alt
    mAttributeTable[BLWmlDocType::kAltAttr].mDefaultTok = 0xC;
    // vspace
    mAttributeTable[BLWmlDocType::kVspaceAttr].mDefaultTok = 0x4E;
    // hspace
    mAttributeTable[BLWmlDocType::kHspaceAttr].mDefaultTok = 0x14;
    // height
    mAttributeTable[BLWmlDocType::kHeightAttr].mDefaultTok = 0x13;
    // width
    mAttributeTable[BLWmlDocType::kWidthAttr].mDefaultTok = 0x4F;
    // title
    mAttributeTable[BLWmlDocType::kTitleAttr]  .mDefaultTok = 0x36;
    // newcontext
    mAttributeTable[BLWmlDocType::kNewContextAttr].mDefaultTok = 0x0;
    attr.setType(BLAttribute::kBoolType);
    attr.setBoolValue(false);
    mAttributeTable[BLWmlDocType::kNewContextAttr].mTokVector.push(&attr, 0x28);
    attr.setBoolValue(true);
    mAttributeTable[BLWmlDocType::kNewContextAttr].mTokVector.push(&attr, 0x29);
    // ordered
    mAttributeTable[BLWmlDocType::kOrderedAttr].mDefaultTok = 0x0;
    attr.setType(BLAttribute::kBoolType);
    attr.setBoolValue(false);
    mAttributeTable[BLWmlDocType::kOrderedAttr].mTokVector.push(&attr, 0x28);
    attr.setBoolValue(true);
    mAttributeTable[BLWmlDocType::kOrderedAttr].mTokVector.push(&attr, 0x29);
    // onenterforward
    mAttributeTable[BLWmlDocType::kOnEnterForwardAttr].mDefaultTok = 0x26;
    // onenterbackward
    mAttributeTable[BLWmlDocType::kOnEnterBackwardAttr].mDefaultTok = 0x25;
    // ontimer
    mAttributeTable[BLWmlDocType::kOnTimerAttr].mDefaultTok = 0x27;
    // type
    mAttributeTable[BLWmlDocType::kTypeAttr].mDefaultTok = 0x37;
    attr.setType(BLAttribute::kTokType);
    attr.setTokValue(BLWmlDocType::kAcceptValue);
    mAttributeTable[BLWmlDocType::kTypeAttr].mTokVector.push(&attr, 0x38);
    attr.setTokValue(BLWmlDocType::kDeleteValue);
    mAttributeTable[BLWmlDocType::kTypeAttr].mTokVector.push(&attr, 0x39);
    attr.setTokValue(BLWmlDocType::kHelpValue);
    mAttributeTable[BLWmlDocType::kAlignAttr].mTokVector.push(&attr, 0x3A);
    attr.setTokValue(BLWmlDocType::kPasswordValue);
    mAttributeTable[BLWmlDocType::kTypeAttr].mTokVector.push(&attr, 0x3B);
```

```
    attr.setTokValue(BLWmlDocType::kOnPickValue);
    mAttributeTable[BLWmlDocType::kTypeAttr].mTokVector.push(&attr, 0x3C);
    attr.setTokValue(BLWmlDocType::kOnEnterBackwardValue);
    mAttributeTable[BLWmlDocType::kTypeAttr].mTokVector.push(&attr, 0x3D);
    attr.setTokValue(BLWmlDocType::kOnEnterForwardValue);
    mAttributeTable[BLWmlDocType::kTypeAttr].mTokVector.push(&attr, 0x3E);
    attr.setTokValue(BLWmlDocType::kOnTimerValue);
    mAttributeTable[BLWmlDocType::kTypeAttr].mTokVector.push(&attr, 0x3F);
    attr.setTokValue(BLWmlDocType::kOptionsValue);
    mAttributeTable[BLWmlDocType::kTypeAttr].mTokVector.push(&attr, 0x45);
    attr.setTokValue(BLWmlDocType::kPrevValue);
    mAttributeTable[BLWmlDocType::kTypeAttr].mTokVector.push(&attr, 0x46);
    attr.setTokValue(BLWmlDocType::kResetValue);
    mAttributeTable[BLWmlDocType::kTypeAttr].mTokVector.push(&attr, 0x47);
    attr.setTokValue(BLWmlDocType::kTextValue);
    mAttributeTable[BLWmlDocType::kTypeAttr].mTokVector.push(&attr, 0x48);
    // domain
    mAttributeTable[BLWmlDocType::kDomainAttr].mDefaultTok = 0xF;
    // path
    mAttributeTable[BLWmlDocType::kPathAttr].mDefaultTok = 0x2A;
    // http-equiv
    mAttributeTable[BLWmlDocType::kHttpEquivAttr].mDefaultTok = 0x5A; // ignore
    // forua
    mAttributeTable[BLWmlDocType::kForuaAttr].mDefaultTok = 0x12;
    // content
    mAttributeTable[BLWmlDocType::kContentAttr].mDefaultTok = 0xD;
    attr.setType(BLAttribute::kCDataType);
    attr.setCDataValue("application/vnd.wap.wmlc;charset=");
    mAttributeTable[BLWmlDocType::kContentAttr].mTokVector.push(&attr, 0x5C);
    // scheme
    mAttributeTable[BLWmlDocType::kSchemeAttr].mDefaultTok = 0x2E;
    // sendreferer
    mAttributeTable[BLWmlDocType::kSendRefererAttr].mDefaultTok = 0x0;
    attr.setType(BLAttribute::kBoolType);
    attr.setBoolValue(false);
    mAttributeTable[BLWmlDocType::kSendRefererAttr].mTokVector.push(&attr, 0x2F);
    attr.setBoolValue(true);
    mAttributeTable[BLWmlDocType::kSendRefererAttr].mTokVector.push(&attr, 0x30);
    // method
    mAttributeTable[BLWmlDocType::kMethodAttr].mDefaultTok = 0x0;
    attr.setType(BLAttribute::kTokType);
    attr.setTokValue(BLWmlDocType::kGetValue);
    mAttributeTable[BLWmlDocType::kMethodAttr].mTokVector.push(&attr, 0x1B);
    attr.setTokValue(BLWmlDocType::kPostValue);
    mAttributeTable[BLWmlDocType::kMethodAttr].mTokVector.push(&attr, 0x1C);
    // enctype
    mAttributeTable[BLWmlDocType::kEncTypeAttr].mDefaultTok = 0x5F;
    attr.setType(BLAttribute::kCDataType);
    attr.setCDataValue("application/x-www-form-urlencoded");
    mAttributeTable[BLWmlDocType::kEncTypeAttr].mTokVector.push(&attr, 0x60);
    attr.setCDataValue("multipart/form-data");
    mAttributeTable[BLWmlDocType::kEncTypeAttr].mTokVector.push(&attr, 0x61);
    // accept-charset
    mAttributeTable[BLWmlDocType::kAcceptCharsetAttr].mDefaultTok = 0x5;
    // iname
    mAttributeTable[BLWmlDocType::kINameAttr].mDefaultTok = 0x16;
    // ivalue
    mAttributeTable[BLWmlDocType::kIValueAttr].mDefaultTok = 0x15;
    // multiple
    mAttributeTable[BLWmlDocType::kMultipleAttr].mDefaultTok = 0x0;
    attr.setType(BLAttribute::kBoolType);
    attr.setBoolValue(false);
    mAttributeTable[BLWmlDocType::kMultipleAttr].mTokVector.push(&attr, 0x1F);
    attr.setBoolValue(true);
    mAttributeTable[BLWmlDocType::kMultipleAttr].mTokVector.push(&attr, 0x20);
    // tabindex
    mAttributeTable[BLWmlDocType::kTabIndexAttr].mDefaultTok = 0x35;
    // onpick
    mAttributeTable[BLWmlDocType::kOnPickAttr].mDefaultTok = 0x24;
    // format
    mAttributeTable[BLWmlDocType::kFormatAttr].mDefaultTok = 0x12;
    // emptyok
    mAttributeTable[BLWmlDocType::kEmptyokAttr].mDefaultTok = 0x0;
    attr.setType(BLAttribute::kBoolType);
    attr.setBoolValue(false);
```

```
    mAttributeTable[BLWmlDocType::kEmptyokAttr].mTokVector.push(&attr, 0x10);
    attr.setBoolValue(true);
    mAttributeTable[BLWmlDocType::kEmptyokAttr].mTokVector.push(&attr, 0x11);
    // size
    mAttributeTable[BLWmlDocType::kSizeAttr].mDefaultTok = 0x31;
    // maxlength
    mAttributeTable[BLWmlDocType::kMaxLengthAttr].mDefaultTok = 0x1A;
    // accesskey
    mAttributeTable[BLWmlDocType::kAccessKeyAttr].mDefaultTok = 0x5E;
    // columns
    mAttributeTable[BLWmlDocType::kColumnsAttr].mDefaultTok = 0x53;
    // label
    mAttributeTable[BLWmlDocType::kLabelAttr].mDefaultTok = 0x18;
    // optional
    mAttributeTable[BLWmlDocType::kOptionalAttr].mDefaultTok = 0x0;
    attr.setType(BLAttribute::kBoolType);
    attr.setBoolValue(false);
    mAttributeTable[BLWmlDocType::kOptionalAttr].mTokVector.push(&attr, 0x28);
    attr.setBoolValue(true);
    mAttributeTable[BLWmlDocType::kOptionalAttr].mTokVector.push(&attr, 0x29);
    // mode
    mAttributeTable[BLWmlDocType::kModeAttr].mDefaultTok = 0x0;
    attr.setType(BLAttribute::kTokType);
    attr.setTokValue(BLWmlDocType::kNoWrapValue);
    mAttributeTable[BLWmlDocType::kModeAttr].mTokVector.push(&attr, 0x1D);
    attr.setTokValue(BLWmlDocType::kWrapValue);
    mAttributeTable[BLWmlDocType::kModeAttr].mTokVector.push(&attr, 0x1E);
    // id
    mAttributeTable[BLWmlDocType::kIDAttr].mDefaultTok = 0x55;

    return 0;
}// BLXmlOutput.cpp

#include "BLXmlOutput.h"
#include "BLDocType.h"

BLXmlOutput::BLXmlOutput(BLTransportStream *transportP, BLTransformManager::ContentType
type)
: mStream(transportP),
  mTransportP(transportP),
  mDocTypeP(NULL),
  mContentType(type)
{
}

inline void
BLXmlOutput::writeChar(char c)
{
    unsigned int intVal = c;
    if (intVal < 0x20)
    {
        if (c == '\r' || c == '\n')
            mStream << c;
    }
    else if (intVal > 0x7E)
    {
        mStream << "&#" << intVal << ';';
    }
    else
    {
        switch (c)
        {
        case '"':
            mStream << "&quot;";
            break;
        case '&':
            mStream << "&amp;";
            break;
        case '\'':
            mStream << "&apos;";
            break;
        case '<':
            mStream << "&lt;";
            break;
        case '>':
```

```
            mStream << "&gt;";
            break;
        default:
            mStream << c;
            break;
        }
    }
}

inline int
BLXmlOutput::charData(const char* data, int length)
{
    for (int i=0; i<length; i++)
        writeChar(data[i]);

    return 0;
}

inline void
BLXmlOutput::charData(const char *str)
{
    while (*str != '\0')
        writeChar(*(str++));
}

int
BLXmlOutput::beginDoc(BLDocType *docTypeP)
{
    mDocTypeP = docTypeP;
    mTransportP->init(BLTransportStream::kUnknownLength, mContentType);
    mStream << "<?xml version=\"1.0\"?>";
    mStream << docTypeP->getDocTypeString();
    return 0;
}

int
BLXmlOutput::endDoc()
{
    mStream.flush();
    return 0;
}

int
BLXmlOutput::beginElement(BLElement *elemP)
{
    mStream << '<' << mDocTypeP->getElementString(elemP->getTok());

    BLElement::AttrVector *attrsP = elemP->getAttrVector();
    for (BLElement::AttrVector::iterator i = attrsP->begin();
         i != attrsP->end();
         i++)
    {
        mStream << ' ' << mDocTypeP->getAttributeString(i->getTok()) << "=\"";

        switch (i->getType())
        {
        case BLAttribute::kTokType:
            mStream << mDocTypeP->getValueString(i->getTokValue());
            break;
        case BLAttribute::kIntType:
            mStream << i->getIntValue();
            break;
        case BLAttribute::kCDataType:
            charData(i->getCDataValue());
            break;
        case BLAttribute::kBoolType:
            mStream << i->getBoolValue() ? "true" : "false";
            break;
        case BLAttribute::kLengthType:
            {
                int intValue = i->getIntValue();
                if (intValue >= 0)
                    mStream << intValue;
                else
                    mStream << -intValue << '%';
```

```
            }
            break;
        case BLAttribute::kNoValueType:
            mStream << mDocTypeP->getAttributeString(i->getTok());
            break;
        }

        mStream << '\"';
    }
    if (elemP->isEmpty())
        mStream << '/';
    mStream << '>';

    return 0;
}

int
BLXmlOutput::endElement(int elemTok)
{
    mStream << "</" << mDocTypeP->getElementString(elemTok) << '>';
    return 0;
}


// BLXmlParser.cpp

#include "BLXmlParser.h"

#define kParseBufSize 2048

BLXmlParser::BLXmlParser(BLDocType *docTypeP, BLDocStream *docStreamP)
: mDocTypeP(docTypeP),
  mDocStreamP(docStreamP),
  mLastWhitespace(true),
  mPreserveWhitespace(false),
  mPastInitialWhitespace(false),
  mIgnoreWhitespace(false),
  mParser(NULL)
{
}

BLXmlParser::~BLXmlParser()
{
}

int
BLXmlParser::init(int /*length*/, BLTransformManager::ContentType /*type*/)
{
    mParser = XML_ParserCreate(NULL);
    if (mParser == NULL)
        return -1;

    XML_SetUserData(mParser, this);
    XML_SetElementHandler(mParser,
                          xmlStartElementHandler,
                          xmlEndElementHandler);
    XML_SetCharacterDataHandler(mParser,
                                xmlCDataHandler);

    mLastWhitespace = true;
    mPreserveWhitespace = false;
    mPastInitialWhitespace = false;
    mIgnoreWhitespace = false;

    return mDocStreamP->beginDoc(mDocTypeP);
}

int
BLXmlParser::put(char *data, int size, bool final)
{
    // skip initial whitespace (to keep expat from crapping out)
    if (!mPastInitialWhitespace)
    {
        for (int i=0; i<size; i++)
```

```
        {
            if (*data <= 0x20)
                data++;
            else
            {
                mPastInitialWhitespace = true;
                break;
            }
        }
    }

    if(!XML_Parse(mParser, data, size, final))
    {
        error(XML_ErrorString(XML_GetErrorCode(mParser)), XML_GetErrorLineNumber(mParser));
        mDocStreamP->endDoc();
        XML_ParserFree(mParser);
        mParser = NULL;
        return -1;
    }

    if (final)
    {
        mDocStreamP->endDoc();
        XML_ParserFree(mParser);
    }

    return 0;
}

void
BLXmlParser::xmlStartElementHandler(void *userData,
                                    const char *name,
                                    const char **atts)

{
    BLXmlParser *parserP = (BLXmlParser*) userData;

    int elemTok =  parserP->mDocTypeP->getElementTok((char*)name);
    if (elemTok != -1)
    {
        BLElement element;
        BLAttribute attr;
        element.setTok(elemTok);

        for (const char **attP=atts; *attP!=0; attP++)
        {
            char *attName = (char*)*attP;
            char *attValue = (char*)*(++attP);

            int attrTok =  parserP->mDocTypeP->getAttributeTok(attName);
            if (attrTok != -1)
            {
                attr.setTok(attrTok);
                attr.setCDataValue(attValue);
                element.addAttribute(&attr);
            }
        }

        parserP->mDocStreamP->beginElement(&element);

        BLElementDef *defP = parserP->mDocTypeP->getElementDef(elemTok);
        parserP->mPreserveWhitespace = defP->getPreserveWhitespace();
        parserP->mIgnoreWhitespace = defP->getIgnoreWhitespace();
        if (defP->getResetWhitespace())
            parserP->mLastWhitespace = true;

        parserP->mElementStack.push_back(defP);
    }
}


void
BLXmlParser::xmlEndElementHandler(void *userData,
                                  const char *name)
{
    BLXmlParser *parserP = (BLXmlParser*) userData;
```

```
    int tag = parserP->mDocTypeP->getElementTok((char*)name);
    if (tag != -1)
    {
        parserP->mDocStreamP->endElement(tag);
        parserP->mElementStack.pop_back();

        if (parserP->mElementStack.size() > 0)
        {
            BLElementDef *defP = parserP->mElementStack.back();
            parserP->mPreserveWhitespace = defP->getPreserveWhitespace();
            parserP->mIgnoreWhitespace = defP->getIgnoreWhitespace();
        }
    }
}

void
BLXmlParser::xmlCDataHandler(void *userData,
                             const XML_Char *str,
                             int len)
{
    BLXmlParser *parserP = (BLXmlParser*) userData;
    char buf[kParseBufSize];
    int strIndex = 0;
    int bufIndex = 0;

    if (parserP->mPreserveWhitespace)
    {
        parserP->mDocStreamP->charData(str, len);
    }
    else
    {
        while (strIndex < len)
        {
            if (str[strIndex] <= 0x20)
            {
                if (!parserP->mLastWhitespace && !parserP->mIgnoreWhitespace)
                {
                    parserP->mLastWhitespace = true;
                    buf[bufIndex++] = ' ';
                }
            }
            else
            {
                parserP->mLastWhitespace = false;
                buf[bufIndex++] = str[strIndex];
            }
            if (bufIndex == kParseBufSize)
            {
                parserP->mDocStreamP->charData(buf, bufIndex);
                bufIndex = 0;
            }
            strIndex++;
        }
    }
    if (bufIndex > 0)
    {
        parserP->mDocStreamP->charData(buf, bufIndex);
    }
}

void
BLXmlParser::error(const char *message, int lineNum)
{
    char buf[kParseBufSize];
    ACE_OS::sprintf(buf, "XML Parse Error: \r\nline %d: %s", lineNum, message);
    mDocStreamP->charData(buf, ACE_OS::strlen(buf));
}// BLDocNormalizer.cpp

#include "BLDocNormalizer.h"

#ifdef ACE_WIN32
#pragma warning(disable:4786)
#endif
```

```
BLDocNormalizer::BLDocNormalizer(BLDocStream *streamP)
: mDocStreamP(streamP),
  mDocTypeP(NULL),
  mPending(false)
{
}

int
BLDocNormalizer::beginDoc(BLDocType *docTypeP)
{
    mDocTypeP = docTypeP;
    mPending = false;

    mContextVector.push_back(new ElemVector);
    return mDocStreamP->beginDoc(docTypeP);
}

int
BLDocNormalizer::endDoc()
{
    // close all elements
    while (mContextVector.size() > 0)
    {
        ElemVector *elemsP = mContextVector.back();
        while (elemsP->size() > 0)
        {
            if (mDocStreamP->endElement(elemsP->back()->getTok()) < 0)
                return -1;
            elemsP->pop_back();
        }
        delete elemsP;
        mContextVector.pop_back();
    }
    return mDocStreamP->endDoc();
}

int
BLDocNormalizer::charData(const char* data, int length)
{
    if (mContextVector.size() == 0)
        return -1;

    BLElementDef *defP = mDocTypeP->getElementDef(BLDocType::kCDataElement);

    if (mPending &&

mDocTypeP->getElementDef(mPendingElement.getTok())->getShortestPath(BLDocType::kCDataElement
) != NULL)
    {
        if (openElement(&mPendingElement) < 0)
            return -1;
        mPending = false;
    }

    // check to see if we can get there from here
    ElemVector *curContextP = mContextVector.back();
    BLElementDef *topElemP = mDocTypeP->getElementDef(curContextP->back()->getTok());
    topElemP = topElemP->getShortestPath(BLDocType::kCDataElement);
    if (topElemP == NULL)
        return 0;

    // traverse the path
    while (topElemP->getTok() != BLDocType::kCDataElement)
    {
        if (topElemP->hasRequiredAttrs())
            return 0;
        mElement.setTok(topElemP->getTok());
        mDocStreamP->beginElement(&mElement);
        if (topElemP->hasNewContext())
        {
            curContextP = new ElemVector();
            mContextVector.push_back(curContextP);
        }
        curContextP->push_back(topElemP);
```

```
        topElemP = topElemP->getShortestPath(BLDocType::kCDataElement);
    }
    return mDocStreamP->charData(data, length);
}

int
BLDocNormalizer::beginElement(BLElement *elemP)
{
    if (mContextVector.size() == 0)
        return -1;

    BLElementDef *defP = mDocTypeP->getElementDef(elemP->getTok());
    if (!defP->validateElement(elemP))
        return 0;

    if (mPending)
    {
        if (elemP->getTok() == mPendingElement.getTok())
        {
            mPendingElement = *elemP;
            return 0;
        }
        else
        {
            if
(mDocTypeP->getElementDef(mPendingElement.getTok())->getShortestPath(elemP->getTok()) !=
NULL)
            {
                if (openElement(&mPendingElement) < 0)
                    return -1;
                mPending = false;
            }
        }
    }

    if (!defP->getEmptyOK())
    {
        mPendingElement = *elemP;
        mPending = true;
        return 0;
    }

    return openElement(elemP);
}

int
BLDocNormalizer::openElement(BLElement *elemP)
{
    ElemVector *curContextP = mContextVector.back();

    // check if element already open in this context, if so close it
    for (ElemVector::reverse_iterator ri = curContextP->rbegin();
        ri != curContextP->rend();
        ri++)
    {
        if ((*ri)->getTok() == elemP->getTok())
        {
            return reopen(elemP);
        }
    }

    // handle root case
    if (curContextP->size() == 0)
    {
        BLElementDef *rootP = mDocTypeP->getRootElemDef();
        curContextP->push_back(rootP);

        mElement.setTok(rootP->getTok());
        if (mDocStreamP->beginElement(&mElement) < 0)
            return -1;

        if (elemP->getTok() == rootP->getTok())
            return 0;
    }
```

```
    // check to see if we can get there from here
    BLElementDef *topElemP = mDocTypeP->getElementDef(curContextP->back()->getTok());
    topElemP = topElemP->getShortestPath(elemP->getTok());
    if (topElemP == NULL)
        return 0;

    // traverse the path
    while (topElemP->getTok() != elemP->getTok())
    {
        if (topElemP->hasRequiredAttrs())
            return 0;
        mElement.setTok(topElemP->getTok());
        mDocStreamP->beginElement(&mElement);
        if (topElemP->hasNewContext())
        {
            curContextP = new ElemVector();
            mContextVector.push_back(curContextP);
        }
        curContextP->push_back(topElemP);

        topElemP = topElemP->getShortestPath(elemP->getTok());
    }

    if (topElemP->hasNewContext())
    {
        curContextP = new ElemVector();
        mContextVector.push_back(curContextP);
    }

    // check to see if it should be empty
    if (elemP->isEmpty() == false)
    {
        if (topElemP->isEmpty() == true)
            elemP->setEmpty(true);
        else
            curContextP->push_back(topElemP);
    }

    return mDocStreamP->beginElement(elemP);
}

int
BLDocNormalizer::endElement(int elemTok)
{
    if (mContextVector.size() == 0)
        return 0;
    if (mPending && mPendingElement.getTok() == elemTok)
    {
        mPending = false;
    }
    ElemVector *curContextP = mContextVector.back();

    // check that it is open
    bool open = false;
    ElemVector::reverse_iterator ri;
    for (ri = curContextP->rbegin();
         ri != curContextP->rend();
         ri++)
    {
        if ((*ri)->getTok() == elemTok)
        {
            open = true;
            break;
        }
    }
    if (!open)
        return 0;

    if (closeElem(elemTok) < 0)
        return -1;
    if (!mDocTypeP->getElementDef(elemTok)->hasHardClose() &&
        mOpenElems.size() > 0 &&
        curContextP->size() > 0)
    {
```

```
        return openElems();
    }
    return 0;
}

int
BLDocNormalizer::reopen(BLElement *elemP)
{
    if (closeElem(elemP->getTok()) < 0)
        return -1;

    mDocStreamP->beginElement(elemP);
    mContextVector.back()->push_back(mDocTypeP->getElementDef(elemP->getTok()));

    if (!mDocTypeP->getElementDef(elemP->getTok())->hasHardClose() &&
        mOpenElems.size() > 0)
    {
        return openElems();
    }

    return 0;
}

int
BLDocNormalizer::closeElem(int elemTok)
{
    ElemVector *curContextP = mContextVector.back();
    mOpenElems.clear();

    // if end of context, close it out
    if (mDocTypeP->getElementDef(elemTok)->hasNewContext())
    {
        delete curContextP;
        mContextVector.pop_back();

        return mDocStreamP->endElement(elemTok);
    }

    // close it and elements above it
    for (ElemVector::reverse_iterator ri = curContextP->rbegin();
         ri != curContextP->rend();
         ri++)
    {
        if (mDocStreamP->endElement((*ri)->getTok()) < 0)
            return -1;
        curContextP->pop_back();

        if ((*ri)->getTok() == elemTok)
            break;
        else
            mOpenElems.push_back(mDocTypeP->getElementDef((*ri)->getTok()));
    }

    return 0;
}

int
BLDocNormalizer::openElems()
{
    ElemVector *curContextP = mContextVector.back();

    // if element immediately above it is valid in new element, reopen it, etc
    for (ElemVector::reverse_iterator ri = mOpenElems.rbegin();
         ri != mOpenElems.rend();
         ri++)
    {
        if (curContextP->back()->getShortestPath((*ri)->getTok()) == *ri)
        {
            if (curContextP->back()->hasRequiredAttrs())
                break;
            curContextP->push_back(*ri);

            mElement.setTok((*ri)->getTok());
            if (mDocStreamP->beginElement(&mElement) < 0)
```

```
            return -1;
        }
        else
            break;
    }

    return 0;
}

// MALConduit.h

#ifndef __MALCONDUIT__
#define __MALCONDUIT__

#include "MALWriter.h"
#include "MALIDs.h"
#include "BLClientInfo.h"

class MALConduitManager;

class MALConduit
{
public:
    MALConduit() {}
    virtual ~MALConduit() {}

    virtual void sendInitialResponse(MALWriter *writerP, BLClientInfo *infoP) = 0;
    virtual void sendNormalResponse(MALWriter *writerP, BLClientInfo *infoP) = 0;

    virtual void openDatabase(char *dbName)         {}
    virtual void closeDatabase()                    {}
    virtual void unknownDatabase(char *dbName) {}
    virtual void newIDs(MALIDs *idsP)               {}
    virtual void record(int32 uid,
                            AGRecordStatus mod,
                            int32 recordDataLength,
                            void *recordData,
                            int32 platformDataLength,
                            void *platformData)         {}
};

class MALConduitFactory
{
public:
    virtual ~MALConduitFactory() {}

    // called after all options have been set
    virtual void initialize(MALConduitManager *) {}
    virtual void finalize() {}

    virtual const char* name() = 0;
    virtual int setOption(const char *name,
                              const char *value) {return 0;}

    virtual MALConduit* makeConduit() = 0;
};

#endif /* __MALCONDUIT__ *//// MALConduitManager.h

#ifndef __MALCONDUITMANAGER__
#define __MALCONDUITMANAGER__

#include <vector>
#include "ace/Hash_Map_Manager.h"
#include "ace/Synch.h"
#include "MALConduit.h"

typedef ACE_Hash_Map_Manager<const char*, int, ACE_Null_Mutex> MALDatabaseMap;

class MALConduitDispatcher;

// registers and manages conduit factories
class MALConduitManager
{
public:
```

```
    static MALConduitManager* instance();

    void initialize();
    void finalize();

    // called by MALConfig.
    MALConduitFactory* activateFactory(const char *name); // returns factoryIndex
    void registerDatabase(const char *name, MALConduitFactory *factoryP);

    MALConduitDispatcher* makeDispatcher();
    int getIndexForDatabase(const char *name);

protected:
    MALConduitManager();
    ~MALConduitManager();

    static MALConduitFactory* sFactoryDefs[];
    static MALConduitManager* sInstanceP;

    std::vector<MALConduitFactory*> mActiveFactories;
    MALDatabaseMap mDatabaseTable;
};

// manages conduits for an instance of MALSession
class MALConduitDispatcher
{
public:
    friend class MALConduitManager;

    ~MALConduitDispatcher();

    MALConduit* getConduitForDatabase(const char *name);
    void sendInitialResponses(MALWriter *writerP, BLClientInfo *infoP);
    void sendNormalResponses(MALWriter *writerP, BLClientInfo *infoP);

protected:
    MALConduitDispatcher() {}
    MALConduitDispatcher(std::vector<MALConduit*> *conduitsP,
                             MALConduitManager *managerP);

    std::vector<MALConduit*> *mConduitsP;
    MALConduitManager *mManagerP;
};

#endif /* __MALCONDUITMANAGER__ *//// MALConfig.h

#ifndef __MALCONFIG__
#define __MALCONFIG__

class MALConduitManager;
class MALConduitFactory;

class MALConfig
{
public:
    MALConfig();
    ~MALConfig();

    int readConfigFile(char *fileName);

    int getPort() {return mPort;}
    const char* getInterface() {return mInterface;}

protected:

    static void xmlStartElementHandler( void *userData,
                                            const char *name,
                                              const char **atts);

    static void xmlEndElementHandler(void *userData,
                                          const char *name);

    void unknownOption(const char *option);

    int mPort;
    int mErrCode;
```

```
    char *mInterface;
    MALConduitManager *mConduitManagerP;
    MALConduitFactory *mCurrentFactoryP;
};

#endif /* __MALCONFIG__ *///  MALConstants.h

#define kMALDefaultFilename "mal.config"
#define kMALDefaultPort 80
#define kMALMaxCommands 10000
#define kFileBufSize 4096// MALIDs.h

#ifndef __MALIDS__
#define __MALIDS__

#include "AGProtocol.h"

// wrapper for AGArray with ids in it
class MALIDs
{
public:
    MALIDs(AGArray *arrayP)
        : mArrayP(arrayP), mIndex(0) {}

    // reset the iterator
    void rewind()
    {
        mIndex = 0;
    }

    // returns number of id pairs
    int count()
    {
        return mArrayP->count / 2;
    }

    // returns true if id's were updated / false if already at end of array
    bool next(int32 *oldidP, int32 *newidP)
    {
        if (mIndex < mArrayP->count)
        {
            *oldidP = (int32)AGArrayElementAt(mArrayP, mIndex);
            *newidP = (int32)AGArrayElementAt(mArrayP, mIndex+1);

            mIndex += 2;
            return true;
        }
        return false;
    }

protected:
    AGArray *mArrayP;
    int mIndex;
};

#endif /* __MALIDS__ *///  MALIO.h

#ifndef __MALIO__
#define __MALIO__

#include "ace/OS.h"

#if !defined (ACE_LACKS_PRAGMA_ONCE)
# pragma once
#endif /* ACE_LACKS_PRAGMA_ONCE */

#include "ace/SOCK_Stream.h"
#include "ace/IOStream.h"
#include "AGReader.h"
#include "AGWriter.h"
#include "MALTypes.h"

class MALIO
{
public:
```

```
    static void init(ACE_SOCK_Stream *streamP, AGReader *readerP, AGWriter *writerP);

protected:
    static int read(void *data, void *dst, int len);
    static int write(void *data, void *buf, int len);
};

#endif /* __MALIO__ *///  MALSession.h

#ifndef __MALSESSION__
#define __MALSESSION__

#include "MALTypes.h"
#include "AGReader.h"
#include "AGWriter.h"
#include "BLClientInfo.h"

class MALConduitManager;
class MALConduitDispatcher;
class MALConduit;

class MALSession
{

public:
    MALSession();
    ~MALSession();

    int doSession(ACE_SOCK_Stream *streamP);

protected:

    int readCommands();
    int readHeader();
    int sendResponse();

    int readExpansionCmd(int len);
    int readHelloCmd();
    int readDeviceInfoCmd();
    int readOpenDatabaseCmd();
    int readCloseDatabaseCmd();
    int readRecordCmd();
    int readUnknownDatabaseCmd();
    int readNewIdsCmd();
    int readPingCmd();
    int readXMLDataCmd();

    int8 mMajorVersion;
    int8 mMinorVersion;
    bool mIsInitialSession;

    AGReader mReader;
    AGWriter mWriter;

    BLClientInfo mClientInfo;
    MALConduitDispatcher *mDispatcherP;
    MALConduit* mConduitP;
};

#endif /* __MALSESSION__ *///  MALTypes.h

#ifndef __MALTYPES__
#define __MALTYPES__

#include "ace/INET_Addr.h"
#include "ace/SOCK_Stream.h"
#include "ace/IOStream.h"

typedef ACE_IOStream<ACE_SOCK_Stream> MAL_IOStream;
#define MAL_IOSTREAM MAL_IOStream, ACE_INET_Addr

#endif /* __MALTYPES__ *///  MALWriter.h

#ifndef __MALWRITER__
```

```
#define __MALWRITER__

#include "AGProtocol.h"
#include "AGPalmProtocol.h"
#include "ace/OS.h"

#define ADD_STRING_LEN(str, strLen) {if (str != NULL) {strLen = ACE_OS::strlen(str);} len +=
AGCompactSize(strLen); len += strLen;}

// wrapper for AGProtocol commands conduits should have access to
class MALWriter
{
public:
    friend class MALSession;

    void writeDatabaseConfig(char *dbname,
                             AGDBConfigType config,
                             AGBool sendRecordPlatformData,
                             int32 platformDataLength,
                             void *platformData)
    {
        AGWriteDATABASECONFIG(mWriterP,
                              dbname,
                              config,
                              sendRecordPlatformData,
                              platformDataLength,
                              platformData);
    }

    void writePalmDatabaseConfig(char *dbname,
                                 AGDBConfigType config,
                                 AGBool sendRecordPlatformData,
                                 uint32 creator,
                                 uint32 type,
                                 uint32 flags)
    {
        int platformDataLength = AGCompactSize(creator);
        platformDataLength += AGCompactSize(type);
        platformDataLength += AGCompactSize(flags);

        int32 len = 0, dbnameLen = 0;

        ADD_STRING_LEN(dbname, dbnameLen);
        len += AGCompactSize(config);
        len += 1; // 1 boolean - sendRecordPlatformData
        len += AGCompactSize(platformDataLength);
        len += platformDataLength;

        // write the command
        AGWriteCompactInt(mWriterP, AG_DATABASECONFIG_CMD);
        AGWriteCompactInt(mWriterP, len);

        AGWriteString(mWriterP, dbname, dbnameLen);
        AGWriteCompactInt(mWriterP, config);
        AGWriteBoolean(mWriterP, sendRecordPlatformData);
        AGWriteCompactInt(mWriterP, platformDataLength);
        AGPalmWriteDBConfigPlatformData(mWriterP, creator, type, flags);
    }

    void writeOpenDatabase(char *dbname)
    {
        AGWriteOPENDATABASE(mWriterP,
                            dbname);
    }

    void writeCloseDatabase()
    {
        AGWriteCLOSEDATABASE(mWriterP);
    }

    void writeDeleteDatabase(char *dbname)
    {
        AGWriteDELETEDATABASE(mWriterP,
                              dbname);
    }
```

```
    void writeClearMods()
    {
        AGWriteCLEARMODS(mWriterP);
    }

    void writeRecord(int32 uid,
                     AGRecordStatus mod,
                     int32 recordDataLength,
                     void *recordData,
                     int32 platformDataLength,
                     void *platformData)
    {
        AGWriteRECORD(mWriterP,
                      uid,
                      mod,
                      recordDataLength,
                      recordData,
                      platformDataLength,
                      platformData);
    }

    void writeTask(char *currentTask)
    {
        AGWriteTASK(mWriterP,
                    currentTask,
                    false);
    }

    void writeItem(int32 currentItemNumber,
                   int32 totalItemCount,
                   char *currentItem)
    {
        AGWriteITEM(mWriterP,
                    currentItemNumber,
                    totalItemCount,
                    currentItem);
    }

    void writeXMLData(int32 dataLen,
                      void *dataBytes)
    {
        AGWriteXMLDATA(mWriterP,
                       dataLen,
                       dataBytes);
    }

    void writeExpansion(int32 expansionCommand,
                        int32 commandLength,
                        void *commandBytes)
    {
        AGWriteEXPANSION(mWriterP,
                         expansionCommand,
                         commandLength,
                         commandBytes);
    }


protected:

    MALWriter(AGWriter *writerP) : mWriterP(writerP) {}
    MALWriter() {}
    ~MALWriter() {}

    void setWriter(AGWriter *writerP)
    {
        mWriterP = writerP;
    }

    AGWriter *mWriterP;
};

#endif /* __MALWRITER__ */
// BLClientInfo.h
```

```
#ifndef __BLCLIENTINFO__
#define __BLCLIENTINFO__

#include "BLTransformManager.h"

// note: client responsible for managing memory
class BLClientInfo
{
public:
    BLClientInfo()
    :  mUsername(NULL),
        mOSName(NULL),
        mOSVersion(NULL),
        mSerialNumber(NULL),
        mLanguage(NULL),
        mCharset(NULL),
        mUserAgent(NULL),
        mAcceptString(NULL),
        mAvailableBytes(0),
        mScreenWidth(0),
        mScreenHeight(0)
    {
    }

    char* getUsername()             {return mUsername;}
    int getAvailableBytes()         {return mAvailableBytes;}
    int getBitDepth()                   {return mBitDepth;}
    char* getOSName()                   {return mOSName;}
    char* getOSVersion()                {return mOSVersion;}
    char* getSerialNumber()         {return mSerialNumber;}
    char* getLanguage()             {return mLanguage;}
    char* getCharset()              {return mCharset;}
    int getScreenWidth()                {return mScreenWidth;}
    int getScreenHeight()           {return mScreenHeight;}
    char* getUserAgent()                {return mUserAgent;}
    char* getAcceptString()         {return mAcceptString;}
    int getUsableScreenWidth()
    {
        // depending on user-agent, modify screen width

        // no checks
        return mScreenWidth - 10;
    }
    int getUsableScreenHeight()
    {
        // depending on user-agent, modify screen height

        return mScreenHeight - 10;
    }

    std::vector<BLTransformManager::ContentType>* getAcceptTypes()    {return
  &mAcceptTypes;}

    void setUsername(char *username)                     {mUsername = username;}
    void setAvailableBytes(int availableBytes) {mAvailableBytes = availableBytes;}
    void setBitDepth(int bitDepth)                  {mBitDepth = bitDepth;}
    void setOSName(char *osName)                       {mOSName = osName;}
    void setOSVersion(char *osVersion)             {mOSVersion = osVersion;}
    void setSerialNumber(char *serialNumber)       {mSerialNumber = serialNumber;}
    void setLanguage(char *language)                  {mLanguage = language;}
    void setCharset(char *charset)                 {mCharset = charset;}
    void setScreenWidth(int width)                 {mScreenWidth = width;}
    void setScreenHeight(int height)                  {mScreenHeight = height;}
    void setUserAgent(char *userAgent)             {mUserAgent = userAgent;}
    void setAcceptString(char *acceptString)       {mAcceptString = acceptString;}
    void setAcceptType(BLTransformManager::ContentType type)
  {mAcceptTypes.push_back(type);}

  protected:
    char *mUsername;
    char *mOSName;
    char *mOSVersion;
    char *mSerialNumber;
    char *mLanguage;
```

```
    char *mCharset;
    char *mUserAgent;
    char *mAcceptString;
    int mAvailableBytes;
    int mScreenWidth;
    int mScreenHeight;
    int mBitDepth;
    std::vector<BLTransformManager::ContentType>   mAcceptTypes;
};

#endif /* __BLCLIENTINFO__ *//// BLClientInfoManager.h

#ifndef __BLCLIENTINFOMANAGER__
#define __BLCLIENTINFOMANAGER__

#include "BLClientInfo.h"

class BLClientInfoManager
{
public:
    static BLClientInfoManager* instance();

    void initialize();
    void finalize();

    BLClientInfo* getUserAgentInfo(const char *uaString);

protected:
    BLClientInfoManager();
    ~BLClientInfoManager();

    static BLClientInfoManager* sInstanceP;

    typedef std::pair<char*, BLClientInfo*> InfoPair;
    std::vector<InfoPair> mInfoVector;
    BLClientInfo* mDefaultInfoP;
};

#endif /* __BLCLIENTINFOMANAGER__ *//// BLLog.h

#ifndef __BLLOG__
#define __BLLOG__

#include "ace/OS.h"
#include "ace/Synch.h"
#include "ace/SOCK_Stream.h"
#include <fstream>

class BLLog
{
protected:
    BLLog(const char *path);

    void writeTimestamp()
    {
        time_t now = ACE_OS::time();
        char *timeStr = ACE_OS::ctime(&now);
        mFile << '[';
        mFile.write(timeStr, ACE_OS::strlen(timeStr) - 1);
        mFile << "] ";
    }

    const char *mPath;
    std::ofstream mFile;
    ACE_Thread_Mutex mMutex;
};

class BLAccessLog : public BLLog
{
public:
    static int initialize();
    static void finalize();

    static void write(char* userAgent, ACE_SOCK_Stream *streamP, char *path)
```

```
    {
        sInstanceP->writeRecord(userAgent, streamP, path);
    }

protected:
    BLAccessLog();
    void writeRecord(char* userAgent, ACE_SOCK_Stream *streamP, char *path)
    {
        if (userAgent == NULL)
            userAgent = "(none)";

        ACE_INET_Addr addr;
        streamP->get_remote_addr(addr);

        mMutex.acquire();

        writeTimestamp();
        mFile << addr.get_host_addr() << ' ' << userAgent << ' ' << path << endl;

        mMutex.release();
    }

    static BLAccessLog *sInstanceP;
};

class BLErrorLog : public BLLog
{
public:
    static int initialize();
    static void finalize();

    static void write(char* message)
    {
        sInstanceP->writeRecord(message);
    }

protected:
    BLErrorLog();
    void writeRecord(char* message)
    {
        mMutex.acquire();

        writeTimestamp();
        mFile << message << endl;

        mMutex.release();
    }

    static BLErrorLog *sInstanceP;
};

#endif /* __BLLOG__ */
// BLUtils.h

#ifndef __BLUTILS_H__
#define __BLUTILS_H__

class BLUtils
{
public:
    static int min(int x, int y)
    {
        return x < y ? x : y;
    }

    static char caseless(char c)
    {
        return c & 0xDF;
    }

    static char* strdup(const char* str)
    {
        char *newStr = new char[ACE_OS::strlen(str) + 1];

        if (newStr != NULL)
```

```
            ACE_OS::strcpy(newStr, str);

        return newStr;
    }
};

#endif /* __BLUTILS_H__ */
// BLHttpAcceptor.h

#ifndef __BLHTTPACCEPTOR__
#define __BLHTTPACCEPTOR__

#include "ace/Acceptor.h"
#include "ace/SOCK_Acceptor.h"
#include "BLHttpHandler.h"

class ACE_Svc_Export BLHttpAcceptor : public ACE_Strategy_Acceptor<BLHttpHandler,
ACE_SOCK_ACCEPTOR>
{
protected:
  // = Service configurator hooks.
  virtual int init (int argc, char *argv[]);
  // Perform initialization.

  virtual int fini();
  // cleanup for shutdown

  virtual int make_svc_handler (BLHttpHandler *&);
  // make a new handler

  int parseArgs (int argc, char *argv[]);
  // parse command line args

  ACE_Schedule_All_Threaded_Strategy<BLHttpHandler> mScheduleStrategy;

  char *mConfigFilename;
};

ACE_SVC_FACTORY_DECLARE (BLHttpAcceptor)

#endif /* __BLHTTPACCEPTOR__ *//// BLHttpBase.h

#ifndef __BLHTTPBASE__
#define __BLHTTPBASE__

#include "ace/SOCK_Stream.h"
#include "BLHttpRequestInfo.h"

class BLTransportStream;

class BLHttpBase
{
public:
    BLHttpBase();

    void init(ACE_SOCK_Stream *streamP, ACE_Time_Value *timeoutP);
    int readMessage(BLTransportStream *transportP);

    int getMajorVersion()  {return mMajorVersion;}
    int getMinorVersion()  {return mMinorVersion;}

protected:
    virtual int handleHeader(const char* name, const char* value) {return 0;}

    int parseHeaders();
    int sendString(const char* str);
    int sendHeader(const char* header, const char* value);
    int sendHeader(const char* header, int);
    int sendHeaders(BLHttpRequestInfo *infoP);
    int readline(char *buf, int size);
    int readChunk(int length, BLTransportStream *transportP);
    int readChunkedEncoding(BLTransportStream *transportP);
    int readFull(BLTransportStream *transportP);

    ACE_SOCK_Stream *mStreamP;
```

```
    ACE_Time_Value mTimeout;

    BLTransformManager::ContentType mContentType;
    int mContentLength;
    int mMajorVersion;
    int mMinorVersion;
    bool mChunkedEncoding;
};

#endif /* __BLHTTPBASE__ *//// BLHttpHandler.h

#ifndef __BLHTTPHANDLER__
#define __BLHTTPHANDLER__

#include "ace/Synch.h"
#include "ace/Svc_Handler.h"
#include "ace/SOCK_Stream.h"
#include "BLHttpBase.h"
#include "BLTransportStream.h"
#include "BLHttpRequestInfo.h"

#ifdef ACE_WIN32
#define HTTP_IOSTREAM ACE_SOCK_Stream, ACE_INET_Addr
#else
#define HTTP_IOSTREAM ACE_SOCK_Stream //, ACE_INET_Addr
#endif //ACE_WIN32

class BLHttpHandler : public ACE_Svc_Handler<HTTP_IOSTREAM, ACE_NULL_SYNCH>, public
BLHttpBase, public BLTransportFeeder
{
  // = TITLE
  //    Product object created by an <MALAcceptor>.  An
  //
  // = DESCRIPTION
  //     Instantiates and processes MALSessions
 public:
    typedef enum {
        kGetType,
        kPostType
    } RequestType;

    BLHttpHandler(ACE_Thread_Manager *threadManagerP = 0);
    ~BLHttpHandler();

    virtual int open (void * = NULL);
    virtual int svc (void);

    RequestType getType()                 { return mType; }
    const char* getUserAgent()            { return mUserAgent; }
    BLHttpRequestInfo* getRequestInfo()   { return &mRequestInfo; }

 protected:
    virtual int feed(BLTransportStream *transportP);
    virtual int handleHeader(const char* name, const char* value);

    int readRequestLine(char *pathBuffer,
                         int bufferSize);


    RequestType mType;
    BLHttpRequestInfo mRequestInfo;
    char *mUserAgent;
};

#endif /* __BLHTTPHANDLER__ */
// BLHttpRequest.h

#ifndef __HTTPREQUEST__
#define __HTTPREQUEST__

#include "ace/SOCK_Stream.h"
#include "ace/SOCK_Connector.h"
#include "BLTransportStream.h"
#include "BLTransportRequest.h"
#include "BLHttpBase.h"
#include "BLUrl.h"
```

```
class BLHttpRequest : public BLTransportRequest, protected BLHttpBase, protected
BLTransportStream
{
public:
    BLHttpRequest();
    virtual ~BLHttpRequest();

    void init(ACE_SOCK_Stream *streamP);
    int requestFile(BLUrl *urlP, BLClientInfo *clientInfoP, BLHttpRequestInfo *infoP);
    virtual int readFile(BLTransportStream *transportP);

    virtual int getContentLength()                                                { return
mContentLength; }
    virtual BLTransformManager::ContentType getContentType()          { return mContentType;
}
    virtual BLHttpRequestInfo* getRequestInfo()                               { return
&mRequestInfo; }                                                                    { return
    char* getLocation()
mLocation; }

protected:
    virtual int init(int length, BLTransformManager::ContentType type);
    virtual int put(char *data,  int size,  bool final);
    virtual int handleHeader(const char* name, const char* value);

    int readStatusLine();

    BLHttpRequestInfo *mProxyInfoP;
    BLHttpRequestInfo mRequestInfo;
    char *mLocation;
};


class BLHttpRequestFactory : public BLTransportRequestFactory
{
public:
    virtual void initialize(BLTransportManager *);
    virtual void finalize();

    virtual const char* getName();
    virtual BLTransportRequest* requestFile(BLUrl *urlP, BLClientInfo *clientInfoP,
BLHttpRequestInfo *infoP);

protected:
    ACE_SOCK_Connector mConnector;
};

#endif /* __HTTPREQUEST__ *//// BLHttpRequestInfo.h

#ifndef __BLHTTPREQUESTINFO__
#define __BLHTTPREQUESTINFO__

#include <vector>
#include <utility>
#include "ace/OS.h"
#include "BLTransportStream.h"
#include "BLUtils.h"

class BLHttpRequestInfo
{
public:
    typedef std::pair<char*, char*> HeaderPair;
    typedef std::vector<HeaderPair> HeaderVector;

    BLHttpRequestInfo()
        : mPostP(NULL)
    {
    }

    ~BLHttpRequestInfo()
    {
        clear();
    }
```

```
    void clear()
    {
        mPostP = NULL;

        for (HeaderVector::iterator i= mHeaders.begin();
                i != mHeaders.end();
                i++)
        {
            delete i->first;
            delete i->second;
        }

        mHeaders.clear();
    }

    void setPostData(BLTransportFeeder *postP)
    {
        mPostP = postP;
    }

    BLTransportFeeder* getPostData()
    {
        BLTransportFeeder* dataP = mPostP;
        mPostP = NULL;
        return dataP;
    }

    void setHeader(const char *name, const char* value)
    {
        HeaderPair pair;
        pair.first = BLUtils::strdup(name);
        pair.second = BLUtils::strdup(value);
        mHeaders.push_back(pair);
    }

    HeaderVector* getHeaders()
    {
        return &mHeaders;
    }

protected:
    BLTransportFeeder *mPostP;
    HeaderVector mHeaders;
};

#endif /* __BLHTTPREQUESTINFO__ *///  BLProxySession.h

#ifndef __BLPROXYSESSION__
#define __BLPROXYSESSION__

#include "BLHttpHandler.h"
#include "BLUrl.h"

class BLClientInfo;
class ProxyStream;

class BLProxySession
{
public:
    BLProxySession();

    int doSession(char *path, BLHttpHandler *handlerP, ACE_SOCK_Stream *ios);

protected:
    int parsePath(char *path, BLUrl *urlP);
    int error(char *error, BLHttpHandler *handlerP, BLClientInfo *clientInfoP,
ACE_SOCK_Stream *ios);
    ProxyStream* getProxyStream(BLHttpHandler *handlerP, ACE_SOCK_Stream *ios,
BLHttpRequestInfo *infoP);
};

#endif /* __BLPROXYSESSION__ *///  BLTransportManager.h

#ifndef __BLTRANSPORTMANAGER__
```

```
#define __BLTRANSPORTMANAGER__

#include "BLUrl.h"
#include "BLTransportRequest.h"

class BLClientInfo;

class BLTransportManager
{
public:
    static BLTransportManager* instance();

    void initialize();
    void finalize();

    // returns NULL on error
    BLTransportRequest* requestFile(BLUrl *urlP, BLClientInfo *clientInfoP,
BLHttpRequestInfo *infoP);

    void registerProtocolHandler(BLUrl::ProtocolType protocol, BLTransportRequestFactory
*factoryP);

protected:
    BLTransportManager();
    ~BLTransportManager();

    BLTransportRequestFactory* getFactoryForProtocol(BLUrl::ProtocolType protocol);

    static BLTransportManager* sInstanceP;
    static BLTransportRequestFactory* sFactoryDefs[];

    BLTransportRequestFactory *mHandlerTable[BLUrl::kNumProtocols];
};

#endif /* __BLTRANSPORTMANAGER__ *///  BLTransportRequest.h

#ifndef __BLTRANSPORTREQUEST__
#define __BLTRANSPORTREQUEST__

#include "BLUrl.h"
#include "BLTransportStream.h"
#include "BLHttpRequestInfo.h"

class BLTransportManager;
class BLTransportStream;
class BLClientInfo;

class BLTransportRequest
{
public:
    virtual ~BLTransportRequest() {}

    virtual int readFile(BLTransportStream *transportP) = 0;

    // return NULL if unknown
    virtual BLTransformManager::ContentType getContentType() = 0;
    // return -1 if unknown
    virtual int   getContentLength() = 0;

    virtual BLHttpRequestInfo* getRequestInfo()        { return NULL; }
};

class BLTransportRequestFactory
{
public:
    virtual ~BLTransportRequestFactory() {}

    // called after all options have been set
    virtual void initialize(BLTransportManager *) {}
    virtual void finalize() {}

    virtual const char* getName() = 0;
    virtual int setOption(const char *name,
                          const char *value) {return 0;}
```

```
    virtual BLTransportRequest* requestFile(BLUrl *urlP, BLClientInfo *clientInfoP,
BLHttpRequestInfo *infoP) = 0;
};

#endif /* __BLTRANSPORTREQUEST__ *//// BLTransportStream.h

#ifndef __BLTRANSPORTSTREAM__
#define __BLTRANSPORTSTREAM__

#include "BLTransformManager.h"

class BLTransportStream
{
public:
    enum {kUnknownLength = -1};

    virtual int init(int length, BLTransformManager::ContentType type) = 0;
    virtual int put(char *data,  int size,  bool final) = 0;
};

class BLTransportFeeder
{
public:
    virtual int feed(BLTransportStream *transportP) = 0;
};

class BLAccumulatingStream : public  BLTransportStream
{
public:
    BLAccumulatingStream();
    virtual ~BLAccumulatingStream();

    virtual int init(int length, BLTransformManager::ContentType type);
    virtual int put(char *data,  int size,  bool final);

    virtual int putFinal(char *data, int size) = 0;

protected:
    char *mDataBufP;
    int,mCurrentDataSize;
    int,mTotalDataSize;
    BLTransformManager::ContentType mType;
};

// a black hole
class BLNullTransportStream : public BLTransportStream
{
    virtual int init(int length, BLTransformManager::ContentType type) {return 0;}
    virtual int put(char *data,  int size,  bool final) {return 0;}
};

#endif /* __BLTRANSPORTSTREAM__ *//// BLTransportWriter.h

#ifndef __BLTRANSPORTWRITER__
#define __BLTRANSPORTWRITER__

#include <ostream.h>

class BLTransportStream;

#define kStreamBufSize 4096

class BLTransportStreamBuf : public streambuf
{
public:
    BLTransportStreamBuf(BLTransportStream *streamP);
    virtual ~BLTransportStreamBuf();

    void setTransportStream(BLTransportStream *streamP)    {mStreamP = streamP;}

protected:
    virtual int overflow(int c = EOF);
    virtual int sync();                                    {return EOF;}
    virtual int underflow()
```

```
    char mBuf[kStreamBufSize];
    BLTransportStream *mStreamP;

class BLTransportWriter : public ostream
{
public:
    BLTransportWriter()
        : mStreamBuf(NULL),
          ostream(&mStreamBuf)
    {
    }

    BLTransportWriter(BLTransportStream *streamP)
        : mStreamBuf(streamP),
          ostream(&mStreamBuf)
    {
    }

    void setTransportStream(BLTransportStream *streamP)
{mStreamBuf.setTransportStream(streamP);}

protected:
    BLTransportStreamBuf mStreamBuf;
};

#endif /* __BLTRANSPORTWRITER__ *//// BLUrl.h

#ifndef __BLURL__
#define __BLURL__

#include "ace/INET_Addr.h"

class BLUrl
{
public:
    BLUrl();
    ~BLUrl();

    typedef enum {
        kUnknownProtocol = -1,
        kHttpProtocol,
        kNumProtocols
    } ProtocolType;

    int set(ProtocolType protocol,
            char *hostName,
            char *path,
            int port);

    int set(ProtocolType protocol,
            char *hostName,
            char *path);

    int set(char *urlString);
    int set(ProtocolType protocol, char *urlString);

    int setRelative(BLUrl *baseUrlP, char *path);
    void setPort(int port);

    const char* getHostname()        {return mHostname;}
    const char* getPath()            {return mPath;}
    ProtocolType getProtocol()       {return mProtocol;}
    ACE_INET_Addr* getAddr()         {return &mAddr;}

    char* toString();

    static bool isRelative(char *urlString);
    static bool isAbsolute(char *urlString)      { return !isRelative(urlString); }

    static ProtocolType stringToProtocolType(char *protocolString);

protected:
    struct ProtocolInfo
```

```
    {
        char *string;
        int defaultPort;
    };

    void clear();
    static ProtocolInfo sProtocolTable[kNumProtocols];

    ProtocolType mProtocol;
    char *mHostname;
    char *mPath;
    char *mString;
    ACE_INET_Addr mAddr;
};

#endif /* __BLURL__ */
#ifndef BLIMAGETRANSFORMER_H
#define BLIMAGETRANSFORMER_H

#include <utility>
#include <vector>

#include "BLTransformation.h"
#include "BLTransportStream.h"

/*#define FilterType HELLO
#define PROT_READ HELLO1
#define PROT_WRITE HELLO2
#define MAP_SHARED HELLO3
#define MAP_PRIVATE HELLO4
#define DIR HELLO5*/

#undef PROT_READ
#undef PROT_WRITE
#undef MAP_SHARED
#undef MAP_PRIVATE
#undef DIR

#define FilterType HELLO
#define DIR HELLO2
#define dirent HELLp3

#include <magick/magick.h>
#include <magick/image.h>

#if defined(__cplusplus) || defined(c_plusplus)
#undef class
#endif

class BLImageTransformerFactory;

class BLImageTransformer : public BLAccumulatingStream, public BLTransformation
{
public:
    BLImageTransformer(BLTransformManager::ContentType fromType,
        BLTransformManager::ContentType toType);

    virtual ~BLImageTransformer();

    int init(BLTransportStream *outputTransportP,
        BLImageTransformerFactory *parentFactoryP);

    virtual BLTransportStream* getTransportStream();

    virtual int putFinal(char *data,  int size);


    void setClientInfo(BLClientInfo *ciP);

private:
    int readMem (const char *blobP, const size_t length);
    int writeImage();
    int transformImage();
    int writePalmBitmap();
```

```
    BLTransportStream *mOutputTransportP;
    BLImageTransformerFactory *mParentFactoryP;
    Image *mImageP;
    ImageInfo mImageInfo;

    BLClientInfo *mClientInfoP;

    int mOutputH;
    int mOutputV;
    int mOutputIsColor;
    int mOutputQuality;
};

class BLImageTransformerFactory : public BLTransformationFactory
{
public:
    BLImageTransformerFactory() : BLTransformationFactory() {}
    ~BLImageTransformerFactory();

    virtual int initialize(BLTransformManager *);
    virtual const char* getName();

    virtual BLTransformation* makeTransformation(BLTransformManager::ContentType fromTyp

BLTransformManager::ContentType toType,                                    BLClientInfo *infoP,
                                                                           BLTransportStream *streamP);

};

#endif
// BLDocNormalizer.h

#ifndef __BLDOCNORMALIZER_H__
#define __BLDOCNORMALIZER_H__

#include "BLDocStream.h"
#include "BLDocType.h"
#include "ace/config.h"
#include <vector>

#ifdef ACE_WIN32
#pragma warning(disable:4786)
#endif

class BLDocNormalizer : public BLDocStream
{
public:
    BLDocNormalizer(BLDocStream *streamP);

    virtual int beginDoc(BLDocType *docTypeP);
    virtual int endDoc();

    virtual int beginElement(BLElement *elemP);
    virtual int endElement(int elemTok);
    virtual int charData(const char* data, int length);

protected:
    int beginElement_i(BLElement *elemP);
    int openElement(BLElement *elemP);
    int reopen(BLElement *elemP);
    int closeElem(int elemTok);
    int openElems();

    typedef std::vector<BLElement> ElemVector;

    struct Context
    {
        ElemVector mOpenElems;
        ElemVector mClosedElems;
    };

    typedef std::vector<Context*>  ContextVector;

    ContextVector mContextVector;
```

```
    ElemVector mPendingElems;
    BLElement mElement;

    BLDocStream *mDocStreamP;
    BLDocType *mDocTypeP;

    const char* mCData;
    int mCDataLength;
};

#endif /* __BLDOCNORMALIZER_H__ *///  BLDocStream.h

#ifndef __BLDOCSTREAM_H__
#define __BLDOCSTREAM_H__

#include <vector>

class BLDocType;
class BLElement;
class BLAttribute;

class BLDocStream
{
public:
    virtual ~BLDocStream() {};

    virtual int beginDoc(BLDocType *docTypeP) = 0;
    virtual int endDoc() = 0;

    virtual int beginElement(BLElement *elemP) = 0;
    virtual int endElement(int elemTok) = 0;
    virtual int charData(const char* data, int length) = 0;
};

class BLAttribute
{
public:
    enum Type
    {
        kTokType,
        kIntType,
        kCDataType,
        kBoolType,
        kLengthType,
        kNoValueType
    };

    BLAttribute();
    ~BLAttribute();
    BLAttribute& operator= (const BLAttribute &attr);

    int cloneString(); // make local copy of string

    void setTok(int attrTok)                        {mTok = attrTok;}
    int getTok()                                        {return mTok;}

    Type getType()                                      {return mType;}
    void setType(Type type)                         {mType = type;}

    void setTokValue(int tokValue);
    void setIntValue(int intValue);
    void setCDataValue(char* cdataValue);
    void setBoolValue(bool boolValue);

    int getTokValue()                                     {return mValue.tokValue;}
    int getIntValue()                                     {return mValue.intValue;}
    char* getCDataValue()                        {return mValue.cdataValue;}
    bool getBoolValue()                                {return mValue.boolValue;}

protected:
    union Value
    {
        int     tokValue;
        int     intValue;
        char*       cdataValue;
```

```
        bool        boolValue;
    };
    Type mType;
    int mTok;
    bool mOwnString;
    Value mValue;
};

class BLElement
{
public:
    typedef std::vector<BLAttribute> AttrVector;

    BLElement();
    BLElement& operator= (BLElement &elem);

    void clear();

    void setTok(int elemTok)                                {mTok = elemTok;}
    int getTok()                                                {return mTok;}

    void setEmpty(bool empty)                               {mEmpty = empty;}
    bool isEmpty()                                              {return mEmpty;}

    void addAttribute(BLAttribute *attrP);
    BLAttribute* getAttribute(int attrTok);
    AttrVector*  getAttrVector()                          {return &mAttrVector;}

protected:
    int mTok;
    bool mEmpty;
    AttrVector mAttrVector;
};

#include "BLDocStream_i.h"

#endif /* __BLDOCSTREAM_H__ *///  BLDocStream_i.h
// DO NOT INCLUDE THIS FILE DIRECTLY

#include "ace/OS.h"
#include "BLUtils.h"

inline
BLAttribute::BLAttribute()
: mOwnString(false)
{
}

inline
BLAttribute::~BLAttribute()
{
    if (mOwnString)
        delete[] mValue.cdataValue;
}

inline BLAttribute&
BLAttribute::operator= (const BLAttribute &attr)
{
    mOwnString = false;
    mType = attr.mType;
    mTok = attr.mTok;
    mValue.cdataValue = attr.mValue.cdataValue;

    return *this;
}

inline int
BLAttribute::cloneString()
{
    if (mType == kCDataType)
    {
        ACE_ALLOCATOR_RETURN(mValue.cdataValue,
                                  BLUtils::strdup(mValue.cdataValue),
                                  -1);
```

```
        mOwnString = true;
    }
    return 0;
}

inline void
BLAttribute::setTokValue(int tokValue)
{
    if (mOwnString)
    {
        delete[] mValue.cdataValue;
        mOwnString = false;
    }
    mType = kTokType;
    mValue.tokValue = tokValue;
}

inline void
BLAttribute::setIntValue(int intValue)
{
    if (mOwnString)
    {
        delete[] mValue.cdataValue;
        mOwnString = false;
    }
    mType = kIntType;
    mValue.intValue = intValue;
}

inline void
BLAttribute::setCDataValue(char* cdataValue)
{
    if (mOwnString)
    {
        delete[] mValue.cdataValue;
        mOwnString = false;
    }
    mType = kCDataType;
    mValue.cdataValue = cdataValue;
}

inline void
BLAttribute::setBoolValue(bool boolValue)
{
    if (mOwnString)
    {
        delete[] mValue.cdataValue;
        mOwnString = false;
    }
    mType = kBoolType;
    mValue.boolValue = boolValue;
}

inline
BLElement::BLElement()
: mEmpty(false)
{
}

inline void
BLElement::clear()
{
    mEmpty = false;
    mAttrVector.clear();
}

inline BLElement&
BLElement::operator= (BLElement &elem)
{
    mEmpty = elem.mEmpty;
    mTok = elem.mTok;
    mAttrVector.clear();
    mAttrVector = elem.mAttrVector;

    for (AttrVector::iterator i = mAttrVector.begin();
```

```
         i != mAttrVector.end();
         i++)
        i->cloneString();
    }
    return *this;
}

inline void
BLElement::addAttribute(BLAttribute *attrP)
{
    mAttrVector.push_back(*attrP);
}

inline BLAttribute*
BLElement::getAttribute(int attrTok)
{
    for (AttrVector::iterator i = mAttrVector.begin();
         i != mAttrVector.end();
         i++)
    {
        if (i->getTok() == attrTok)
            return &(*i);
    }
    return NULL;
}

// BLDocTransformer.h

#ifndef __BLDOCTRANSFORMER_H__
#define __BLDOCTRANSFORMER_H__

#include "BLTransformation.h"
#include "BLHtmlDocType.h"
#include "BLWmlDocType.h"
#include "BLWmlcTable.h"

class BLDocParser;
class BLDocStream;

class BLDocTransformer : public BLTransformation
{
public:
    friend class BLDocTransformerFactory;

    BLDocTransformer(BLTransformManager::ContentType fromType,
                     BLTransformManager::ContentType toType);
    virtual ~BLDocTransformer();

    int init(BLTransportStream *streamP);

    virtual BLTransportStream* getTransportStream();

protected:
    BLTransportStream *mParserP;
    BLDocStream *mNormalizerP;
    BLDocStream *mAdapterP;
    BLDocStream *mOutputP;

    static BLHtmlDocType* sHtmlDocType;
    static BLWmlDocType*  sWmlDocType;
    static BLWmlcTable* sWmlcTable;
};

class BLDocTransformerFactory : public BLTransformationFactory
{
public:
    virtual int initialize(BLTransformManager *);
    virtual const char* getName();

    virtual BLTransformation* makeTransformation(BLTransformManager::ContentType fromType,
BLTransformManager::ContentType toType,                                   BLClientInfo *infoP,
                                                                           BLTransportStream *streamP);
```

```
protected:
    BLHtmlDocType mHtmlDocType;
    BLWmlDocType mWmlDocType;
    BLWmlcTable mWmlcTable;
};

#endif /* __BLDOCTRANSFORMER_H__ *///  BLDocType.h

#ifndef __BLDOCTYPE_H__
#define __BLDOCTYPE_H__

#include "BLTokenTable.h"
#include "BLDocStream.h"
#include <vector>

class BLAttributeDef;
class BLElementDef;

class BLDocType
{
public:
    enum {kCDataElement = 0};

    BLDocType(int numElems);
    virtual ~BLDocType();

    virtual int initialize() = 0;

    BLElementDef* getElementDef(int elemTok);
    bool validateElement(BLElement *elemP);

    int getElementTok(char* str);
    const char* getElementString(int elemTok);

    int getAttributeTok(char* str);
    const char* getAttributeString(int attrTok);

    int getValueTok(char* str);
    const char* getValueString(int valueTok);

    int getEntityTok(char* str);

    virtual const char* getDocTypeString() = 0;
    virtual BLElementDef* getRootElemDef() = 0;

  protected:
    int initTables(int numElems, int numAttrs, int numValues);
    int initPaths();

    void addClassToElem(int elem, int elemClass);
    void addClassToClass(int superClass, int subclass);
    void addElemsToClass(int toClass, int elemClass);

    void addElementTok(char* string, int tok);
    void addAttributeTok(char* string, int tok);
    void addValueTok(char* string, int tok);
    void addEntityTok(char* string, int tok);

    BLAttributeDef* makeAttrDef(int attrTok, BLAttribute::Type attrType, bool required);

    int mNumElements;
    char **mElementStrings;
    BLElementDef *mElementDefs;
    BLTokenTable mElementToks;

    char **mAttributeStrings;
    BLTokenTable mAttributeToks;
    std::vector<BLAttributeDef*> mAttributeDefs;

    char **mValueStrings;
    BLTokenTable mValueToks;

    BLTokenTable mEntityToks;
  };
```

```
class BLElementDef
{
    friend class BLDocType;

public:
    int getTok()                                              {return mTok;}
    bool hasRequiredAttrs()                             {return mRequiredAttrs.size() != 0;}
    bool hasNewContext()                                      {return mNewContext;}
    bool hasHardClose()                                 {return mHardClose;}
    bool isEmpty()                                             {return mElems.size() == 0;}
    bool getEmptyOK()                                          {return mEmptyOK;}
    int  getNumAttrs()                                  {return mNumAttrs;}
    bool getIgnoreWhitespace()                          {return mIgnoreWhitespace;}
    bool getResetWhitespace()                           {return mResetWhitespace;}
    bool getPreserveWhitespace()                        {return mPreserveWhitespace;}
    BLElementDef* getShortestPath(int elemTok) {return mElemPathsP[elemTok];}

    bool validateElement(BLElement *elem);

    void setNewContext()                                      {mNewContext = true;}
    void setHardClose()                                 {mHardClose = true;}
    void setPreserveWhitespace()                        {mPreserveWhitespace = true;}
    void setIgnoreWhitespace()                          {mIgnoreWhitespace = true;}
    void setResetWhitespace()                           {mResetWhitespace = true;}
    void setEmptyOK(bool ok)                            {mEmptyOK = ok;}
    void addToClass(int elemClass)                {mClass |= elemClass;}
    int getClass()                                            {return mClass;}
    void addAttribute(BLAttributeDef *attrP);
    void addElement(BLElementDef *elemP);
    void removeElement(BLElementDef *elemP);

  protected:
    BLElementDef();
    ~BLElementDef();
    int initShortestPath(BLElementDef* elemP);
    int init(int elemTok, int numElems, int numAttrs);

    int mClass;
    int mNumAttrs;
    int mTok;
    bool mNewContext;
    bool mHardClose;
    bool mInPath;
    bool mEmptyOK;
    bool mPreserveWhitespace;
    bool mIgnoreWhitespace;
    bool mResetWhitespace;

    std::vector<BLElementDef*>  mElems;
    BLElementDef** mElemPathsP;
    int* mElemDistancesP;

    std::vector<BLAttributeDef*> mRequiredAttrs;
    BLAttributeDef** mAttrsP;
    unsigned char* mAttrIndexesP;
};

#include "BLDocType_i.h"

#endif /* __BLDOCTYPE_H__ *///  BLDocType_i.h
// DO NOT INCLUDE THIS FILE DIRECTLY

class BLAttributeDef
{
public:
    BLAttributeDef(int attrTok,
                   BLAttribute::Type type,
                   bool required,
                   BLTokenTable *valueTokTableP)

      : mTok(attrTok),
        mType(type),
        mRequired(required),
        mValueTokTableP(valueTokTableP)
      {
```

```
    }

    BLAttribute::Type getType()                         {return mType;}
    int getTok()                                              {return mTok;}
    bool isRequired()                                         {return mRequired;}
    std::vector<int>*  getValueToks()                   {return &mValueToks;}

    void addValueTok(int tok)                                 {mValueToks.push_back(tok);}

    bool verifyValue(BLAttribute *attrP);

protected:
    int mTok;
    bool mRequired;
    BLAttribute::Type mType;
    std::vector<int>  mValueToks;
    BLTokenTable *mValueTokTableP;
};

inline BLElementDef*
BLDocType::getElementDef(int elemTok)
{
    return &mElementDefs[elemTok];
}

inline bool
BLDocType::validateElement(BLElement *elemP)
{
    return mElementDefs[elemP->getTok()].validateElement(elemP);
}

inline int
BLDocType::getElementTok(char* str)
{
    return mElementToks.getCaselessToken(str);
}

inline const char*
BLDocType::getElementString(int elemTok)
{
    char* str = mElementStrings[elemTok];
    if (str == NULL)
        return "unknown";
    return str;
}

inline int
BLDocType::getAttributeTok(char* str)
{
    return mAttributeToks.getCaselessToken(str);
}

inline const char*
BLDocType::getAttributeString(int attrTok)
{
    char* str = mAttributeStrings[attrTok];
    if (str == NULL)
        return "unknown";
    return str;
}

inline int
BLDocType::getValueTok(char* str)
{
    return mValueToks.getCaselessToken(str);
}

inline const char*
BLDocType::getValueString(int valueTok)
{
    char* str = mValueStrings[valueTok];
    if (str == NULL)
        return "unknown";
    return str;
}
```

```
// BLHtmlDocType.h
#ifndef __BLHTMLDOCTYPE_H__
#define __BLHTMLDOCTYPE_H__

#include "BLDocType.h"

class BLHtmlDocType : public BLDocType
{
public:
    enum {
        kCDataElement = 0,
        kHtmlElement,
        kTeleTypeElement,
        kItalicElement,
        kBoldElement,
        kUnderlineElement,
        kStrikeElement,
        kBigElement,
        kSmallElement,
        kSubscriptElement,
        kSuperscriptElement,
        kEmphasisElement,
        kStrongElement,
        kFontElement,
        kBaseFontElement,
        kLinebreakElement,
        kBodyElement,
        kDivElement,
        kAnchorElement,
        kCenterElement,
        kMapElement,
        kAreaElement,
        kImageElement,
        kHorizontalRuleElement,
        kParagraphElement,
        kHeading1Element,
        kHeading2Element,
        kHeading3Element,
        kHeading4Element,
        kHeading5Element,
        kHeading6Element,
        kPreElement,
        kBlockQuoteElement,
        kDefinitionListElement,
        kDefinitionTermElement,
        kDefinitionDefinitionElement,
        kOrderedListElement,
        kUnorderedListElement,
        kListElement,
        kFormElement,
        kInputElement,
        kSelectElement,
        kOptionElement,
        kTextAreaElement,
        kTableElement,
        kTableRowElement,
        kTableHeaderElement,
        kTableDataElement,
        kCaptionElement,
        kHeadElement,
        kTitleElement,
        kBaseElement,
        kMetaElement,
        kStyleElement,
        kScriptElement,
        kNumElements
    };

    enum {
        kSizeAttr = 0,
        kColorAttr,
        kBackgroundColorAttr,
        kTextAttr,
```

```
        kLinkAttr,
        kVisitedLinkAttr,
        kActiveLinkAttr,
        kAlignAttr,
        kNameAttr,
        kHrefAttr,
        kUseMapAttr,
        kIsMapAttr,
        kNoShadeAttr,
        kNoHrefAttr,
        kShapeAttr,
        kCoordsAttr,
        kAltAttr,
        kSrcAttr,
        kHeightAttr,
        kWidthAttr,
        kBorderAttr,
        kHorizontalSpaceAttr,
        kVerticalSpaceAttr,
        kStartAttr,
        kActionAttr,
        kMethodAttr,
        kEncodingTypeAttr,
        kTypeAttr,
        kValueAttr,
        kCheckedAttr,
        kMaxLengthAttr,
        kMultipleAttr,
        kSelectedAttr,
        kRowsAttr,
        kColsAttr,
        kCellSpacingAttr,
        kCellPaddingAttr,
        kHorizontalAlignAttr,
        kVerticalAlignAttr,
        kRowSpanAttr,
        kColSpanAttr,
        kHttpEquivAttr,
        kContentAttr,
        kNumAttrs
    };

    enum {
        kLeftValue = 0,
        kCenterValue,
        kRightValue,
        kRectValue,
        kCircleValue,
        kPolyValue,
        kTopValue,
        kMiddleValue,
        kBottomValue,
        kGetValue,
        kPostValue,
        kTextValue,
        kPasswordValue,
        kCheckboxValue,
        kRadioValue,
        kSubmitValue,
        kResetValue,
        kFileValue,
        kHiddenValue,
        kImageValue,
        kRefreshValue,
        kNumValues
    };

    BLHtmlDocType();

    virtual int initialize();
    virtual const char* getDocTypeString();
    virtual BLElementDef* getRootElemDef();

protected:
    void initClasses();
```

```
    void initElements();
    void initElementToks();
    void initAttributeToks();
    void initValueToks();
    void initEntityToks();
};

#endif /* __BLHTMLDOCTYPE_H__ *///  BLHtmlParser.h
/*
#ifndef __BLHTMLPARSER_H__
#define __BLHTMLPARSER_H__

#include "BLDocType.h"
#include "BLDocStream.h"
#include "BLTransportStream.h"
#include <utility>

#define kParseBufSize 4096
#define kEntityBufSize 10
#define kMaxEntitySize 7
#define kMaxTableColumns 50

class BLHtmlParser : public BLTransportStream
{
public:
    BLHtmlParser(BLDocType *docTypeP, BLDocStream *docStreamP);

    // call before parsing new document
    virtual int init(int length, BLTransformManager::ContentType type);

    // set final = true when this is the last chunk of the doc
    // (size may be 0)
    virtual int put(char *data,
                    int size,
                    bool final);

protected:
    void parseBuf(char *data,
                  int size,
                  bool final);
    inline void doLinebreaks();
    inline void beginTag();
    inline void beginTagDone();
    inline void endTag();
    inline void attribute();
    inline void value();
    inline void charData();
    inline void doEntity(int entity);
    inline void charEntity();
    inline void decimalEntity();
    inline void hexEntity();
    inline void beginDocument();
    inline void endDocument();
    inline int  lookahead(char closeChar,
                          int minDistance,
                          int maxDistance,
                          char *buf,
                          int bufLen);
    void dumpScratch();

    int  mState;
    bool mLastCharDataSpace;
    bool mLastValueSpace;

    char mParseBuf[kParseBufSize];
    char mScratchBuf[kParseBufSize];
    char mTitleBuf[kTitleSize];

    BLElement mElement;
    BLAttribute mAttribute;

    int mScratchDistance;
    int mScratchMinDistance;
    char mScratchCloseChar;
    char mLookaheadChar;
```

```
    char mScratchChar;

    char *mParseP;
    char *mValueP;
    char *mScratchP;

    BLDocType* mDocTypeP;
    BLDocStream* mDocStreamP;
};
*/
#endif /* __BLHTMLPARSER_H__ *//// BLTokenTable.h

#ifndef __BLTOKENTABLE__
#define __BLTOKENTABLE__

#include "ace/Hash_Map_Manager.h"
#include "BLUtils.h"

#define kMaxTokenSize 256

class BLTokenTable : public ACE_Hash_Map_Manager<const char*, int, ACE_Null_Mutex>
{
public:
    BLTokenTable();
    ~BLTokenTable();

    inline int getToken(char *str);
    inline int getCaselessToken(char *str); //note: alters original token

    void bindToken(char *str, int token);
    void bindCaselessToken(char *str, int token);
};

inline int
BLTokenTable::getToken(char *str)
{
    ACE_Hash_Map_Entry<const char*, int> *entry;

    if(find(str, entry) == 0)
      return entry->int_id_;

    return -1;
}

inline int
BLTokenTable::getCaselessToken(char *str)
{
    char buf[kMaxTokenSize];
    int i;

    for (i=0;
         i < kMaxTokenSize - 1;
         i++)
    {
        if (str[i] == '\0')
            break;
        buf[i] = BLUtils::caseless(str[i]);
    }
    buf[i] = '\0';

    return getToken(buf);
}

inline void
BLTokenTable::bindToken(char *str, int token)
{
    bind(BLUtils::strdup(str), token);
}

inline void
BLTokenTable::bindCaselessToken(char *str, int token)
{
    int len = ACE_OS::strlen(str);
    char *newstr = new char[len + 1];
```

```
    for (int i=0; i<len; i++)
        newstr[i] = BLUtils::caseless(str[i]);
    newstr[len] = '\0';

    bind(newstr, token);
}

#endif /* __BLTOKENTABLE__ *//// BLTransformManager.h

#ifndef __BLTRANSFORMMANAGER__
#define __BLTRANSFORMMANAGER__

#include <vector>
#include <utility>

// prevent overly long symbols
#define BLTransformManager BLTM
#define BLTransformationFactory BLTF


class ACE_Null_Mutex;

template <class EXT_ID, class INT_ID, class ACE_LOCK>
class ACE_Hash_Map_Manager;

class BLTransformation;
class BLTransformationFactory;
class BLClientInfo;
class BLTransportStream;

class BLTransformManager
{
public:
    typedef enum {
        kUnknownType = -1,
        kHTMLType = 0,
        kWMLType,
        kWMLCType,
        kJPEGType,
        kGIFType,
        kPNGType,
        kWBMPType,
        kPalmBMPType,
        kFormUrlEncodedType,
        kNumContentTypes
    } ContentType;

    static BLTransformManager* instance();

    int initialize();
    void finalize();

    // returns NULL on error
    BLTransformation* getTransformation(BLClientInfo *infoP,
                                        ContentType fromType,
                                        BLTransportStream *streamP);

    BLTransformation* getTransformation(BLClientInfo *infoP,
                                        char* fromType,
                                        BLTransportStream *streamP);


    ContentType stringToContentType(char *str);
    const char* contentTypeToString(ContentType type);

    void registerTransformation(ContentType fromType, ContentType toType,
BLTransformationFactory *factoryP);

protected:
    BLTransformManager();
    ~BLTransformManager();

    void setContentTypeString(ContentType type, char *str);

    static BLTransformManager* sInstanceP;
    static BLTransformationFactory* sFactoryDefs[];
```

```
    typedef std::pair<ContentType, BLTransformationFactory*> ContentPair;
    typedef ACE_Hash_Map_Manager<const char*, ContentType, ACE_Null_Mutex> ContentMap;

    std::vector<ContentPair> mTransformationTable[kNumContentTypes];
    ContentMap *mContentMapP;
    char* mContentStrings[kNumContentTypes];
};

#endif /* __BLTRANSFORMMANAGER__ *///  BLTransformation.h

#ifndef __BLTRANSFORMATION__
#define __BLTRANSFORMATION__

#include "BLTransformManager.h"

class BLTransformation
{
public:
    BLTransformation(BLTransformManager::ContentType fromType,
                     BLTransformManager::ContentType toType)
  : mFromType(fromType),
    mToType(toType)
    {
    }
    virtual ~BLTransformation() {}

    virtual BLTransportStream* getTransportStream() = 0;

    BLTransformManager::ContentType getOriginType()          { return mFromType; }
    BLTransformManager::ContentType getDestinationType()  { return mToType; }

protected:
    BLTransformManager::ContentType mFromType;
    BLTransformManager::ContentType mToType;
};

class BLTransformationFactory
{
public:
    virtual ~BLTransformationFactory() {}

    // called after all options have been set
    virtual int initialize(BLTransformManager *) {return 0;}
    virtual void finalize() {}

    virtual const char* getName() = 0;
    virtual int setOption(const char *name,
                          const char *value) {return 0;}

    virtual BLTransformation* makeTransformation(BLTransformManager::ContentType fromType,

 BLTransformManager::ContentType toType,                       BLClientInfo *infoP,
                                                               BLTransportStream *streamP) =

 0;
 };

#endif /* __BLTRANSFORMATION__ *///  BLWbxmlOutput.h

#ifndef __BLWBMXMLOUTPUT_H__
#define __BLWBMXMLOUTPUT_H__

#include "BLDocStream.h"
#include "BLTransportStream.h"
#include "BLTransportWriter.h"

class BLWbxmlTable;

class BLWbxmlOutput : public BLDocStream
{
public:
    BLWbxmlOutput(BLTransportStream *transportP, BLWbxmlTable *tableP,
BLTransformManager::ContentType type);

    virtual int beginDoc(BLDocType *docTypeP);
```

```
    virtual int endDoc();
    virtual int beginElement(BLElement *elemP);
    virtual int endElement(int elemTok);
    virtual int charData(const char* data, int length);

protected:

    void writeAttr(BLAttribute *attrP);

    BLWbxmlTable *mTableP;
    BLDocType *mDocTypeP;
    BLTransportWriter mStream;
    BLTransportStream *mTransportP;
    BLTransformManager::ContentType mContentType;

    bool mInCData;
};

class BLWbxmlTable
{
public:
    BLWbxmlTable();
    ~BLWbxmlTable();

    typedef std::pair<char, class BLAttribute> ValueTokPair;
    class TokVector : public std::vector<ValueTokPair>
    {
    public:
        void push(BLAttribute *attrP, char c)
        {
            ValueTokPair p;
            p.first = c;
            p.second = *attrP;
            push_back(p);
        }
    };

    unsigned char getElementTok(int elemTok);
    unsigned char getDefaultTok(int attrTok);
    unsigned char getValueTok(int valueTok);
    TokVector* getAttrToks(int attrTok);

protected:
    class AttrMap
    {
    public:
        AttrMap() : mDefaultTok('\0') {}

        AttrMap& operator=(const AttrMap& map)
        {
            mDefaultTok = map.mDefaultTok;
            mTokVector = map.mTokVector;
            return *this;
        }
        char mDefaultTok;
        TokVector mTokVector;
    };

    unsigned char* mElementTable;
    unsigned char* mValueTable;
    AttrMap* mAttributeTable;
};

#endif /* __BLWBMXMLOUTPUT_H__ */
// BLWmlDocType.h

#ifndef __BLWMLDOCTYPE_H__
#define __BLWMLDOCTYPE_H__

#include "BLDocType.h"

class BLWmlDocType : public BLDocType
{
public:
```

```
enum {
    kCDataElement = 0,
    kWmlElement,
    kCardElement,
    kDoElement,
    kOnEventElement,
    kHeadElement,
    kTemplateElement,
    kAccessElement,
    kMetaElement,
    kGoElement,
    kPrevElement,
    kRefreshElement,
    kNoopElement,
    kPostfieldElement,
    kSetVarElement,
    kSelectElement,
    kOptGroupElement,
    kOptionElement,
    kInputElement,
    kFieldSetElement,
    kTimerElement,
    kImageElement,
    kAnchorElement,
    kAElement,
    kTableElement,
    kTableRowElement,
    kTableDataElement,
    kEmphasisElement,
    kStrongElement,
    kBoldElement,
    kItalicElement,
    kUnderlineElement,
    kBigElement,
    kSmallElement,
    kParagraphElement,
    kLinebreakElement,
    kPreElement,
    kNumElements
};

enum {
    kHrefAttr = 0,
    kNameAttr,
    kValueAttr,
    kAlignAttr,
    kSrcAttr,
    kLocalSrcAttr,
    kAltAttr,
    kVspaceAttr,
    kHspaceAttr,
    kHeightAttr,
    kWidthAttr,
    kTitleAttr,
    kNewContextAttr,
    kOrderedAttr,
    kOnEnterForwardAttr,
    kOnEnterBackwardAttr,
    kOnTimerAttr,
    kCDataAttr,
    kEntityAttr,
    kTypeAttr,
    kDomainAttr,
    kPathAttr,
    kHttpEquivAttr,
    kForuaAttr,
    kContentAttr,
    kSchemeAttr,
    kSendRefererAttr,
    kMethodAttr,
    kEncTypeAttr,
    kAcceptCharsetAttr,
    kINameAttr,
    kIValueAttr,
    kMultipleAttr,
```

```
        kTabIndexAttr,
        kOnPickAttr,
        kFormatAttr,
        kEmptyokAttr,
        kSizeAttr,
        kMaxLengthAttr,
        kAccessKeyAttr,
        kColumnsAttr,
        kLabelAttr,
        kOptionalAttr,
        kModeAttr,
        kIDAttr,
        kNumAttrs
    };

    enum {
        kLeftValue = 0,
        kCenterValue,
        kRightValue,
        kTopValue,
        kMiddleValue,
        kBottomValue,
        kTrueValue,
        kFalseValue,
        kPostValue,
        kGetValue,
        kTextValue,
        kPasswordValue,
        kWrapValue,
        kNoWrapValue,
        kAcceptValue,
        kDeleteValue,
        kHelpValue,
        kOnPickValue,
        kOnEnterBackwardValue,
        kOnEnterForwardValue,
        kOnTimerValue,
        kOptionsValue,
        kPrevValue,
        kResetValue,
        kUnknownValue,
        kNumValues
    };

    BLWmlDocType();

    virtual int initialize();
    virtual const char* getDocTypeString();
    virtual BLElementDef* getRootElemDef();

protected:
    void initClasses();
    void initElements();
    void initElementToks();
    void initAttributeToks();
    void initValueToks();
    void initEntityToks();
};

#endif /* __BLWMLDOCTYPE_H__ *//// BLWmlcTable.h

#ifndef __BLWMLCTABLE_H__
#define __BLWMLCTABLE_H__

#include "BLWbxmlOutput.h"

class BLWmlcTable : public BLWbxmlTable
{
public:
    BLWmlcTable() : BLWbxmlTable() {}

    int initialize();

protected:
    int makeElementTable();
```

```
    int makeValueTable();
    int makeAttributeTable();
};

#endif /* __BLWMLCTABLE_H__ */
// BLXmlOutput.h

#ifndef __BLXMLOUTPUT_H__
#define __BLXMLOUTPUT_H__

#include "BLTransportWriter.h"
#include "BLTransportStream.h"
#include "BLDocStream.h"

class BLXmlOutput : public BLDocStream
{
public:
    BLXmlOutput(BLTransportStream *transportP, BLTransformManager::ContentType type);

    virtual int beginDoc(BLDocType *docTypeP);
    virtual int endDoc();

    virtual int beginElement(BLElement *elemP);
    virtual int endElement(int elemTok);
    virtual int charData(const char* data, int length);

protected:
    void charData(const char *str);
    void writeChar(char c);

    BLDocType *mDocTypeP;
    BLTransportStream *mTransportP;
    BLTransportWriter mStream;
    BLTransformManager::ContentType mContentType;
};

#endif /* __BLXMLOUTPUT_H__ *//// BLXmlParser.h

#ifndef __BLXMLPARSER_H__
#define __BLXMLPARSER_H__

#include "BLDocType.h"
#include "BLTransportStream.h"
#include "xmlparse.h"

class BLXmlParser : public BLTransportStream
{
public:
    BLXmlParser(BLDocType *docTypeP, BLDocStream *docStreamP);
    ~BLXmlParser();

    virtual int init(int length, BLTransformManager::ContentType type);
    virtual int put(char *data,
                    int size,
                    bool final);

protected:
    static void xmlStartElementHandler( void *userData,
                                        const char *name,
                                        const char **atts);

    static void xmlEndElementHandler(void *userData,
                                     const char *name);

    static void xmlCDataHandler(void *userData,
                                const char *s,
                                int len);

    void error(const char *message, int lineNum);

    BLDocType *mDocTypeP;
    BLDocStream *mDocStreamP;

    bool mPastInitialWhitespace;
    bool mPreserveWhitespace;
    bool mIgnoreWhitespace;
    bool mLastWhitespace;
```

```
    XML_Parser mParser;
    std::vector<BLElementDef*> mElementStack;
};

#endif /* __BLXMLPARSER_H__ */
```

APPENDIX C

Browser Source Code

```
// BLApplication.cpp

/**
    general application methods.
*/

#include "BLApplication.h"
#include "BLIterator.h"

BLApplication *
BLApplication::mThis = NULL;


BLApplication::BLApplication()
{
}

BLApplication::~BLApplication()
{
}

void
BLApplication::initialize()
{
    mPrefs = NULL;
    mCurrentFormHandler = NULL;
    mCurrentMenuHandler = NULL;

    mThis = this;
}


/*
launch codes (from Palm devzone knowledge base):

scptLaunchCmdExecuteCmd           Execute the specified Network login script plugin command.
scptLaunchCmdListCmds             Provide information about the commands that your Network
script plugin executes.
sysAppLaunchCmdAddRecord          Add a record to a database.
sysAppLaunchCmdAlarmTriggered     Schedule next alarm or perform quick actions such as sounding
alarm tones.
sysAppLaunchCmdCountryChange      Respond to country change.
sysAppLaunchCmdDisplayAlarm       Display specified alarm dialog or perform time-consuming
alarm-related actions.
sysAppLaunchCmdExgAskUser         Let application override display of dialog asking user if
they want to receive
                                  incoming data via the exchange manager.
sysAppLaunchCmdExgReceiveData     Notify application that it should receive incoming data via
the exchange manager.
sysAppLaunchCmdFind               Find a text string.
sysAppLaunchCmdGoto               Go to a particular record, display it, and optionally select
the specified text.
sysAppLaunchCmdGoToURL            Launch Clipper application and open a URL. (Palm VII system
only.)
sysAppLaunchCmdInitDatabase       Initialize database.
sysAppLaunchCmdLookup             Look up data. In contrast to sysAppLaunchCmdFind, a level of
indirection is implied.
                                  For example, look up a phone number associated with a name.
sysAppLaunchCmdNormalLaunch       Launch normally.
sysAppLaunchCmdOpenDB             Launch application and open a database. (Palm VII system
only.)
sysAppLaunchCmdPanelCalledFromApp  Tell preferences panel that it was invoked from an
application, not the Preferences application.
sysAppLaunchCmdReturnFromPanel Tell an application that it's restarting after preferences
panel had been called.
sysAppLaunchCmdSaveData           Save data. Often sent before find operations.
sysAppLaunchCmdSyncNotify         Notify applications that a HotSync has been completed.
sysAppLaunchCmdSystemLock         Sent to the Security application to request that the system
be locked down.
sysAppLaunchCmdSystemReset        Respond to system reset. No UI is allowed during this launch
code.
sysAppLaunchCmdTimeChange         Respond to system time change.
sysAppLaunchCmdURLParams          Launch an application with parameters from Clipper. (Palm VII
system only.)
*/
```

```
void
BLApplication::getEvent(EventType & event)
{
#ifdef ENABLE_NETWORKING
    mNetwork.getEvent(event);
#else
    EvtGetEvent(&event, evtWaitForever);
#endif
}


DWord
BLApplication::eventLoop()
{
    Word error = 0;
    EventType event;

    do {
        getEvent(event);

        if (!SysHandleEvent(&event))
            if (!MenuHandleEvent(0, &event, &error))
                if (!handleEvent(&event))
                    FrmDispatchEvent(&event);

    } while (event.eType != appStopEvent);

    if(mCurrentFormHandler)
        mCurrentFormHandler->formClose();

    return error;
}


Boolean
BLApplication::handleEvent(EventPtr eventP)
{
    Boolean handled = false;
    FormPtr formP;
    Word formID;

    switch(eventP->eType)
    {
        case frmLoadEvent:
            formID = eventP->data.frmLoad.formID;
            formP = FrmInitForm(formID);

            FrmSetEventHandler(formP, formEventDispatcher);
            FrmSetActiveForm(formP);

            setFormHandler(formID);

            mCurrentFormHandler->formLoad(formP);

            handled = true;
            break;

        case frmOpenEvent:
            formP = mCurrentFormHandler->getFormPtr();

            FrmDrawForm(formP);
            mCurrentFormHandler->formOpen();

            handled = true;
            break;

        case frmCloseEvent:
            formP = mCurrentFormHandler->getFormPtr();

            mCurrentFormHandler->formClose();
            mCurrentFormHandler = NULL;
            FrmEraseForm(formP);
            FrmDeleteForm(formP);
```

```
        handled = true;
        break;

    case menuEvent:
        if(mCurrentMenuHandler)
            handled = mCurrentMenuHandler->handleEvent(eventP);
        break;

#ifdef ENABLE_NETWORKING

    case inetSockReadyEvent:
        if(((INetEventType *)eventP)->data.inetSockReady.inputReady)
        {
            Handle sockH = ((INetEventType *)eventP)->data.inetSockReady.sockH;
            mNetwork.dataReady(sockH);
        }
        break;

    case inetSockStatusChangeEvent:
    //  Handle  sockH2 = ((INetEventType *)eventP)->data.inetSockStatusChange.sockH;
        mNetwork.displayStatus(((INetEventType
*)eventP)->data.inetSockStatusChange.status);
        break;
#endif
    }

    return handled;
}


Boolean
BLApplication::formEventDispatcher(EventPtr eventP)
{
    Boolean handled = false;

    if(mThis->mCurrentFormHandler)
        handled = mThis->mCurrentFormHandler->handleEvent(eventP);

    return handled;
}


void
BLApplication::registerHandler(BLEventHandler * handler)
{
    mHandlers.add(handler);
}


void
BLApplication::setFormHandler(Word formID)
{
    BLIterator<BLEventHandler*, kHandlerInc> iter(mHandlers);

    while(iter.hasNext())
    {
        BLEventHandler* handler = iter.getNext();

        if( handler->doesHandleType(BLEventHandler::kFormType) &&
            handler->doesHandleObject(formID))
            mCurrentFormHandler = dynamic_cast<BLForm *>(handler);
    }
}


#ifdef ENABLE_NETWORKING

void
BLApplication::startNetworking()
{
    mNetwork.start();
}
```

```
void
BLApplication::stopNetworking()
{
    mNetwork.stop();
}

#endif // ENABLE_NETWORKING
// BLApplication.h

#pragma once

#include "BLVector.h"
#include "BLForm.h"
#include "BLNetworking.h"

class BLPrefs;

class BLApplication
{
    public:

        enum {  appFileCreator = '????',
                ourMinVersion = sysMakeROMVersion(2,0,0,sysROMStageRelease,0),
                kHandlerInc = 4 };

                                BLApplication();
        virtual                 ~BLApplication();

                    void        initialize();

        virtual DWord           launchNormal() = 0;

        inline  void            getEvent(EventType & event);
                DWord           eventLoop();
                Boolean         handleEvent(EventPtr eventP);
        static  Boolean         formEventDispatcher(EventPtr eventP);

                void            setPrefs(BLPrefs * prefs) { mPrefs = prefs; }
                BLPrefs *       getPrefs() { return mPrefs; }

                void            registerHandler(BLEventHandler * handler);
                void            setFormHandler(Word formID);

    protected:


#ifdef ENABLE_NETWORKING
                void            startNetworking();
                void            stopNetworking();
                BLNetworking    mNetwork;
#endif


    private:

        static  BLApplication * mThis;

                BLVector<BLEventHandler*, kHandlerInc> mHandlers;
                BLPrefs *   mPrefs;

                BLForm *    mCurrentFormHandler;
                BLEventHandler *    mCurrentMenuHandler;

};#include "BLBookmark.h"


BLBookmark::BLBookmark ()
{
    // This constructor should be called in the app start call
    mBookmarkDBP = new BLBookmarkDB();
    mBookmarkDBP->openBookmarkDB();
    mChoicesHandle = NULL;
    mChoicesPtrsHandle = NULL;
    mLastOpenUrlP = NULL;
}
```

```
BLBookmark::~BLBookmark()
{
    freeMemForBookmarksPopup();
    delete mBookmarkDBP;
}


Boolean
BLBookmark::gotoPageHandleEvent(EventPtr eventP)
{
    Boolean handled = false;

    switch (eventP->eType)
    {
        case ctlSelectEvent:
            if (eventP->data.ctlEnter.controlID == GotoPageGoButton)
            {
                // get the url and pass it to the browser
                mOpenUrlP = FldGetTextPtr((FieldType*)BLUtils::getObjectPtr
(GotoPageURLField));
                mLastOpenUrlP = BLUtils::cloneString(mOpenUrlP);
            }
            break;

        case menuEvent:
            // First clear the menu status from the display.
            MenuEraseStatus(0);
            BLBookmark::bookmarkDoMenuCommand(eventP->data.menu.itemID);
            handled = true;
            break;

        case keyDownEvent:
            handled = processKeyDown(eventP);
            break;

        case penDownEvent:
            testInsPos(eventP);
            break;
    }
    return(handled);
}


Boolean
BLBookmark::bookmarksEditHandleEvent(EventPtr eventP)
{
    Boolean handled = false;
    Boolean isCreated = true;
    FormPtr frmP, previousForm;
    ListPtr lstP;
    UInt    numRecords;

    switch (eventP->eType)
    {
        case ctlSelectEvent:
            if (eventP->data.ctlEnter.controlID == BookmarksEditNewButton)
            {
                previousForm = FrmGetActiveForm();
                BLUtils::initBasicDialogForm(frmP, BookmarksAddForm, bookmarksAddHandleEvent,
BookmarksAddNameField);
                BLUtils::setFieldToStrResource(BookmarksAddURLField, DefaultProtocolString);
                FrmDoDialog(frmP);
                FrmDeleteForm(frmP);
                FrmSetActiveForm(previousForm);
                handled = true;
            }

            else if (eventP->data.ctlEnter.controlID == BookmarksEditDetailsButton)
            {
                if (mBookmarkDBP->isValidRecord())
                {
                    previousForm = FrmGetActiveForm();
                    BLUtils::initBasicDialogForm(frmP, BookmarksDetailsForm,
bookmarksDetailsHandleEvent, BookmarksDetailsNameField);
```

```
                    mBookmarkDBP->loadBookmarkRecord(BookmarksDetailsNameField,
BookmarksDetailsURLField, BookmarksDetailsOfflineCheckbox);
                    FrmDoDialog(frmP);
                    FrmDeleteForm(frmP);
                    FrmSetActiveForm(previousForm);
                    handled = true;
                }
                else
                {   // if no bookmarks, issue alert
                    FrmAlert(BookmarkDetailsAlert);
                }
                handled = true;
            }

            else if (eventP->data.ctlEnter.controlID == BookmarksEditDeleteButton)
            {
                // if the current record is valid
                if (mBookmarkDBP->isValidRecord())
                {
                    if (mBookmarkDBP->getNumRecords() > 0) {
                        mBookmarkDBP->deleteCurrentRecord();
                        numRecords = mBookmarkDBP->getNumRecords();
                    }
                    frmP = FrmGetActiveForm();
                    lstP = (ListPtr) FrmGetObjectPtr(frmP, FrmGetObjectIndex(frmP,
BookmarksEditListList));
                    LstSetListChoices(lstP, NULL, numRecords);
                    // after delete set selection to nothing
                    LstSetSelection(lstP, -1);
                    LstDrawList(lstP);
                }
                else
                {
                    FrmAlert(BookmarkDeleteAlert);
                }
                handled = true;

            }
            break;

        case menuEvent:
            // First clear the menu status from the display.
            MenuEraseStatus(0);

            // process menu commands for the bookmark form
            bookmarkDoMenuCommand(eventP->data.menu.itemID);
            handled = true;
            break;

        case lstSelectEvent:
            // Get the current selection from the list and set the current record to edit.
            frmP = FrmGetActiveForm();
            lstP = (ListPtr) FrmGetObjectPtr(frmP, FrmGetObjectIndex(frmP,
BookmarksEditListList));
            mBookmarkDBP->setCurrentRecord(LstGetSelection(lstP));
            handled = true;
            break;

        case frmUpdateEvent:
            if (eventP->data.frmUpdate.updateCode == kListUpdateCode)
                initBookmarkEditForm(BookmarksEditListList);
            handled = true;
            break;

        case frmCloseEvent:
            break;
    }
    return(handled);

}


Boolean
BLBookmark::bookmarksAddHandleEvent(EventPtr eventP)
{
```

```
    if (numRecords)
    {
        // Get a pointer to the list object.
        lstP = (ListPtr) FrmGetObjectPtr(frmP, FrmGetObjectIndex(frmP, listID));

        // Set the number of list choices.
        LstSetListChoices(lstP, NULL, numRecords);

        // Set the callback function to draw each list entry.
        LstSetDrawFunction(lstP, BLBookmarkDB::editFormListDrawItem);

        LstSetSelection(lstP, mBookmarkDBP->getCurrentRecord());
    }
    FrmDrawForm(frmP);
}


/***********************************************************************
 *
 * FUNCTION:      updateBookmarksPopup
 *
 * DESCRIPTION:   sets the updated database info for the given pop up list
 *
 * PARAMETERS:    frm - pointer to the main form.
 *
 * RETURNED:      Nothing.
 *
 ***********************************************************************/
void
BLBookmark::updateBookmarksPopup(Word popupListID)
{
    FormPtr         frmP;
    ListPtr         lstP;
    UInt            numRecords;
    CharPtr         choicesP;
    RectangleType   lstRect;
    Int             itemIndex, lstWidth;

    freeMemForBookmarksPopup();
    frmP = FrmGetActiveForm();

    // Get the number of records currently in the application's database.
    numRecords = mBookmarkDBP->getNumRecords();

    // Get a pointer to the list object.
    itemIndex = FrmGetObjectIndex(frmP, popupListID);

    // Get a pointer to the list object.
    lstP = (ListPtr) FrmGetObjectPtr(frmP, itemIndex);

    // Get the usable width of the list rectangle.
    FrmGetObjectBounds (frmP, itemIndex, &lstRect);
    lstWidth = lstRect.extent.x - 2;

    // Allocate an initial block for the list choices.
    mChoicesHandle = MemHandleNew(sizeof(char));

    choicesP = (CharPtr) MemHandleLock(mChoicesHandle);
    *choicesP = 0;

    // the database updates the choices
    mBookmarkDBP->constructPopupListArray(itemIndex, numRecords, lstWidth, mChoicesHandle,
choicesP);

    // Note that we add one to the numRecords to include the Edit Bookmarks command
    // at the bottom of the popup list.

    // Create an array of pointers from the choices strings.
    mChoicesPtrsHandle = SysFormPointerArrayToStrings(choicesP, numRecords + 1);

    // Set the list choices from the array of pointers.
    LstSetListChoices(lstP, (Char**) MemHandleLock(mChoicesPtrsHandle), numRecords + 1);

    // Set the number of visible items
    LstSetHeight(lstP, numRecords + 1);
```

```
}
/***********************************************************************
 *
 * FUNCTION:      freeMemForBookmarksPopup
 *
 * DESCRIPTION:   frees the memory assoc with the popup list. Should be
 *                between calls to updatePopupList and when app quits.
 *
 * PARAMETERS:    Nothing.
 *
 * RETURNED:      Nothing.
 *
 ***********************************************************************/
void
BLBookmark::freeMemForBookmarksPopup(void)
{
    // Free the memory blocks allocated for the list.
    if (mChoicesHandle)
    {
        MemHandleFree(mChoicesHandle);
        mChoicesHandle = NULL;
        MemHandleFree(mChoicesPtrsHandle);
        mChoicesPtrsHandle = NULL;
    }
}


/* AUTO COMPLETE CODE */

void
BLBookmark::initGotoPageDialog(void)
{
    CharPtr string = mLastOpenUrlP;

    if(string == NULL)
        string = "http://";

    setCurrInsPos(StrLen(string) - 1);
    setIsNewInsPos(false);

    mOpenUrlP = NULL;
}


void
BLBookmark::setCurrInsPos(int i)
{
    mCurrInsPos = i;
}


void
BLBookmark::setIsNewInsPos(Boolean val)
{
    mIsNewInsPos = val;
}


// if user clicked in field set mIsNewInsPos to true
void
BLBookmark::testInsPos(EventPtr eventP)
{
    RectangleType rectT;
    PointType ptT;
    FieldPtr fldP;

    fldP = (FieldPtr) BLUtils::getObjectPtr (GotoPageURLField);
    FldGetBounds (fldP, &rectT);
    ptT = eventP->data.penUp.start;
    if (RctPtInRectangle (ptT.x, ptT.y, &rectT))
    {
        mIsNewInsPos = true;
    }
}
```

```
Boolean
BLBookmark::processKeyDown(EventPtr eventP)
{
    CharPtr newCharP, prevUrlP, newUrlP, urlSuggP;
    int prevUrlLen, newUrlLen, suggestionUrlLen;
    FieldPtr fldP;
    char newChar;
    Boolean handled = false;

    if (mIsNewInsPos) {
        setIsNewInsPos(false);
        return false;
    }

    // get the new character entered
    newChar = (char)eventP->data.keyDown.chr;
    newCharP = &newChar;

    fldP = (FieldPtr) BLUtils::getObjectPtr (GotoPageURLField);
    // get the prev url
    prevUrlP = FldGetTextPtr(fldP);
    prevUrlLen = StrLen(prevUrlP);

    mCurrInsPos = FldGetInsPtPosition (fldP);
    // check if the user has deleted a letter
    if (newChar == '\b')
    {
        newUrlLen = prevUrlLen - 1;
        mCurrInsPos--;
    }
    else
    {
        newUrlLen = prevUrlLen + 1;
        mCurrInsPos++;
    }

    // only do the auto complete if the user has added a letter
    if (newUrlLen > prevUrlLen)
    {
        newUrlP = new Char[newUrlLen + 1];
        StrCopy(newUrlP, prevUrlP);
        // tack on the new character to the url
        StrCat(newUrlP, newCharP);

        urlSuggP = mBookmarkDBP->getFirstUrlMatch(newUrlP);
        if (urlSuggP)
        {
            BLUtils::writeStrToField(GotoPageURLField, urlSuggP);
            suggestionUrlLen = StrLen(urlSuggP);
            FldSetSelection (fldP, mCurrInsPos, suggestionUrlLen);
            FldSetInsPtPosition (fldP, mCurrInsPos);
            FldDrawField(fldP);
            delete urlSuggP;
            handled = true;
        }
        else handled = false;
        delete newUrlP;
    }
    return handled;
}


CharPtr
BLBookmark::getUrl(Word index)
{
    CharPtr urlP;

    mBookmarkDBP->getUrlForRecord(index, urlP);

    return urlP;
}#pragma once

#include "BLBookmarkDB.h"
```

```
static BLBookmarkDB* mBookmarkDBP;

class BLBookmark
{
    public:

        BLBookmark();
        ~BLBookmark();

        // Bookmark Form Handlers
        Boolean         bookmarkPopupHandleEvent(EventPtr eventP);
        Boolean         gotoPageHandleEvent(EventPtr eventP);
        Boolean         bookmarksEditHandleEvent(EventPtr eventP);

        // Callbacks
        static Boolean  bookmarksAddHandleEvent(EventPtr eventP);
        static Boolean  bookmarksDetailsHandleEvent(EventPtr eventP);

        void            updateBookmarksPopup(Word popupListID);
        static void     bookmarkDoMenuCommand(Word command);
        void            initBookmarkEditForm(Word listID);

        // Handles
        VoidHand mChoicesHandle, mChoicesPtrsHandle;   // handles for dynamic list data

        // auto complete

        void            initGotoPageDialog();
        void            setCurrInsPos(int i);
        void            setIsNewInsPos(Boolean val);

        CharPtr         getUrl(Word index);
        CharPtr         getOpenUrl() { return mOpenUrlP; }

        CharPtr         getLastOpenUrlP() { return mLastOpenUrlP; }

    protected:

        // Helper methods
        FieldPtr        getFocusObjectPtr(void);
        void            freeMemForBookmarksPopup(void);
        Boolean         processKeyDown(EventPtr eventP);
        void            testInsPos(EventPtr eventP);

        // Member Variables
        enum{   kListUpdateCode = 0x01 };

        // Auto complete vars
        Word            mCurrInsPos, mIsNewInsPos;
        CharPtr         mOpenUrlP;
        CharPtr         mLastOpenUrlP;

};#include "BLBookmarkDB.h"

const CharPtr kUntitledBookmarkNameP = "-Untitled-";

BLBookmarkDB::BLBookmarkDB()
{
    mBookmarkAppType = 'Book';          // type for application.  must be 4 chars, mixed
case.
    mBookmarkDBType = 'Book';           // type for application database.  must be 4 chars,
mixed case.
    mBookmarkDBName = "BookmarkDB";     // name for application database.  up to 31
characters.
    mCurrentRecord = kNoRecordSelected; // Set current bookmark database record to no
current record.
    kEditBookmarksCommand = "Edit Bookmarks...";
}


BLBookmarkDB::~BLBookmarkDB()
{
    closeBookmarkDB();
}
```

```
UInt BLBookmarkDB::getCurrentRecord(void)
{
    return mCurrentRecord;
}


void BLBookmarkDB::setCurrentRecord(Word index)
{
    mCurrentRecord = index;
}


UInt BLBookmarkDB::getNumRecords(void)
{
    return DmNumRecords(mBookmarkDB);
}


Boolean BLBookmarkDB::isValidRecord(void)
{
    if (mCurrentRecord == kNoRecordSelected) return false;
    return true;
}


/***********************************************************************
 *
 * FUNCTION:    openBookmarkDB
 *
 * DESCRIPTION: This routine opens the bookmark database and sets globals.
 *
 * PARAMETERS:  None.
 *
 * RETURNED:    nothing.
 *
 ***********************************************************************/
void BLBookmarkDB::openBookmarkDB(void)
{
    Err      error;          // error code
    UInt        cardNo;        // card containing the application database
    LocalID     dbID;          // handle for application database
    UInt        dbAttrs;
    UInt        mode;

    // Find the bookmark database.
    mode = dmModeReadWrite;
    mBookmarkDB = DmOpenDatabaseByTypeCreator(mBookmarkDBType, mBookmarkAppType, mode);
    if (!mBookmarkDB)
    {
        //  The database doesn't exist, create it now.
        error = DmCreateDatabase(0, mBookmarkDBName, mBookmarkAppType, mBookmarkDBType,
false);

        // Check for fatal error.
        ErrFatalDisplayIf(error, "Could not create new bookmark database.");

        // Find the application's database.
        mBookmarkDB = DmOpenDatabaseByTypeCreator(mBookmarkDBType, mBookmarkAppType, mode);

        // Get info about the database
        error = DmOpenDatabaseInfo(mBookmarkDB, &dbID, NULL, NULL, &cardNo, NULL);

        // Check for fatal error.
        ErrFatalDisplayIf(error, "Could not get bookmark database info.");

        // Get attributes for the database
        error = DmDatabaseInfo(0, dbID, NULL, &dbAttrs, NULL, NULL, NULL, NULL, NULL, NULL,
NULL, NULL, NULL);

        // Check for fatal error.
        ErrFatalDisplayIf(error, "Could not get bookmark database info.");

        // Set the new attributes in the database
```

```
        error = DmSetDatabaseInfo(0, dbID, NULL, &dbAttrs, NULL, NULL, NULL, NULL, NULL,
NULL, NULL, NULL, NULL);

        // Check for fatal error.
        ErrFatalDisplayIf(error, "Could not set bookmark database info.");
    }

}


void BLBookmarkDB::closeBookmarkDB(void)
{
    DmCloseDatabase(mBookmarkDB);
}

/***********************************************************************
 *
 * FUNCTION:    saveBookmarkRecord
 *
 * DESCRIPTION: This function writes the bookmark data into the database.
 *              It checks for the case where there is no user input
 *
 * PARAMETERS:  None.
 *
 * RETURNED:    nothing.
 *
 ***********************************************************************/
void BLBookmarkDB::saveBookmarkRecord (Word nameFieldID, Word urlFieldID, Boolean
isNewRecord, Boolean isCached)
{
    VoidHand            recordH;
    VoidPtr             recordP;
    ULong               nameSize=0;
    ULong               nameLen=0;
    ULong               urlSize=0;
    Char                zero=0;
    UInt                index=0;       // Index for the first record.
    CharPtr             nameP;
    CharPtr             urlP;

    nameP = FldGetTextPtr((FieldType*)BLUtils::getObjectPtr(nameFieldID));
    urlP = FldGetTextPtr((FieldType*)BLUtils::getObjectPtr(urlFieldID));

    // Compute the size of the bookmark record.
    if (nameP) {
        nameLen = StrLen(nameP);
        if (nameLen > 0)
        {
            nameSize = nameLen + 1;
        }
        else {
            nameSize = StrLen(kUntitledBookmarkNameP) + 1;
        }
    }
    else {
        nameLen = 0;
        nameSize = StrLen(kUntitledBookmarkNameP) + 1;
    }

    if (urlP)
        urlSize = StrLen(urlP) + 1;
    else
        urlSize = 1;

    if (isNewRecord)
    {
        //  Allocate a chunk in the database for the new record.
        recordH = DmNewRecord(mBookmarkDB, &index, (nameSize + urlSize + sizeof(Boolean)));
        mCurrentRecord = index;
    }
    else
    {
        if (mCurrentRecord != kNoRecordSelected && DmNumRecords(mBookmarkDB) > 0)
        {
```

```
        recordH = DmResizeRecord(mBookmarkDB, mCurrentRecord, (nameSize + urlSize +
sizeof(Boolean)));
        if (!recordH) ErrFatalDisplay("Problem resizing Bookmark Record");
      }
      else
      {
        ErrFatalDisplay("Failed to find Bookmark record while attempting to save
update");
      }
    }

    // Lock down the handle and get a pointer to the new record.
    recordP = MemHandleLock(recordH);

    if (nameLen > 0)
      DmWrite(recordP, 0, nameP, nameSize);
    else
      DmWrite(recordP, 0, kUntitledBookmarkNameP, nameSize);


    if (urlP)
      DmWrite(recordP, nameSize, urlP, urlSize);
    else
      DmWrite(recordP, nameSize, &zero, 1);

    // write the Boolean isCached to the record
    DmWrite(recordP, nameSize + urlSize, &isCached, sizeof(Boolean));

    // Unlock the new record.
    MemHandleUnlock(recordH);

    // Release the record to the database manager.  The true value indicates that
    // the record contains "dirty" data.  Release Record will set the record's
    // dirty flag and update the database modification count.
    DmReleaseRecord(mBookmarkDB, index, true);
}


/**********************************************************************
 *
 * FUNCTION:    deleteCurrentRecord
 *
 * DESCRIPTION: This function delete the currently selected record.
 *
 * PARAMETERS:  None.
 *
 * RETURNED:    nothing.
 *
 **********************************************************************/
void BLBookmarkDB::deleteCurrentRecord (void)
{
    // remove current record from the database.
    DmRemoveRecord(mBookmarkDB, mCurrentRecord);
    // this causes nothing to be selected in the list.
    mCurrentRecord = kNoRecordSelected;

    /*
    // if we delete the last record, then we must set the current
    // record to be one less. Otherwise we rely on the database shifting its indexes.
    if((mCurrentRecord + 1) == numRecords) {
        mCurrentRecord--;
    }*/

}

/**********************************************************************
 *
 * FUNCTION:    bookmarkLoadRecord
 *
 * DESCRIPTION: This routine loads a bookmark entry into the appropriate
 *              fields.
 *
 * PARAMETERS:  frm - pointer to the Note View form
 *
```

```
 * RETURNED:    nothing
 *
 **********************************************************************/
void BLBookmarkDB::loadBookmarkRecord (Word nameFieldID, Word urlFieldID, Word checkboxID)
{
    Word offset = 0;
    VoidHand recordH;
    CharPtr recordP;

    // Check to make sure there is a record to retrieve.
    if (mCurrentRecord != kNoRecordSelected && DmNumRecords(mBookmarkDB) > 0)
    {
        // Get a handle for the current record.
        recordH = DmGetRecord (mBookmarkDB, mCurrentRecord);

        // Lock down the handle and get a pointer to the record data.
        recordP = (CharPtr)MemHandleLock(recordH);

        BLUtils::writeStrToField(nameFieldID, recordP);

        // Now do the same for the url field
        recordP += StrLen(recordP) + 1;

        BLUtils::writeStrToField(urlFieldID, recordP);

        // advance pointer to Boolean isCached value
        recordP += StrLen(recordP) + 1;
        CtlSetValue((ControlPtr)BLUtils::getObjectPtr(checkboxID), recordP[0]);

        // Unlock the database record.
        MemHandleUnlock(recordH);

        // Release the record to the database system.
        // (The zero means that the record data hasn't been changed.)
        DmReleaseRecord(mBookmarkDB, mCurrentRecord, 0);
    }
}

/**********************************************************************
 *
 * FUNCTION:        getUrlForRecord
 *
 * DESCRIPTION:     This function copies the url for a given record index
 *                  Note that the caller should FREE the memory after it is done.
 *                  Also a test for no an empty url should be considered.
 *
 * PARAMETERS:      index - of bookmark
 *                  urlP
 *
 * RETURNED:        Nothing.
 *
 **********************************************************************/
void BLBookmarkDB::getUrlForRecord(Word index, CharPtr& urlP)
{
    VoidHand recordH;
    CharPtr recordP;
    Word numRecords;

    numRecords = getNumRecords();

    if((index < 0) || (index >= numRecords))
    {
        ErrDisplay("Attempted to get url for record index out of range");
    }
    else
    {
        // Get a handle for the current record.
        recordH = DmGetRecord (mBookmarkDB, index);

        // Lock down the handle and get a pointer to the record data.
        recordP = (CharPtr)MemHandleLock(recordH);

        // advance ptr to url field
        recordP += StrLen(recordP) + 1;
```

```
        urlP = new Char[StrLen(recordP) + 1];

        // Copy the data from the record to the new memory chunk.
        StrCopy(urlP, recordP);

        // Unlock the database record.
        MemHandleUnlock(recordH);

        // Release the record to the database system.
        // (The zero means that the record data hasn't been changed.)
        DmReleaseRecord(mBookmarkDB, index, 0);

        return;
    }

    urlP = NULL;
}

/************************************************************************
 *
 * FUNCTION:        constructPopupListArray
 *
 * DESCRIPTION:     This function iterates over the database and pulls out
 *                  the bookmark names. It puts them into the mChoicesHandle array
 *
 *
 * PARAMETERS:      itemIndex,
 *                  numRecords
 *                  lstWidth
 *                  mChoicesHandle
 *                  choicesP
 *
 *
 * RETURNED:        Nothing.
 *
 ***********************************************************************/
void BLBookmarkDB::constructPopupListArray (UInt itemIndex, UInt numRecords,
                UInt lstWidth, VoidHand& mChoicesHandle, CharPtr& choicesP)
{

    Handle  recordH;
    CharPtr recordP;
    Int i, textLen;
    Int choicesOffset = 0;
    Boolean fits;
    Err error;

    // A sequence of strings packed one after another, one for each record.
    for (itemIndex = 0; itemIndex <= numRecords; itemIndex++)
    {
        // the last element is the Edit Bookmark command.
        if (itemIndex == numRecords) {
            recordP = kEditBookmarksCommand;
        }
        else {
            recordH = (Handle) DmGetRecord(mBookmarkDB, itemIndex);
            recordP = (CharPtr) MemHandleLock(recordH);
        }

        // Determine the length of text that will fit within the list bounds.
        i = (Int) lstWidth;
        textLen = (Int) StrLen(recordP);
        FntCharsInWidth(recordP, &i, &textLen, &fits);

        // Grow the choices buffer to accomodate the new string. We must unlock
        // the chunk so that the Memory Manager can move the chunk if neccessary to
        // grow it.
        MemHandleUnlock(mChoicesHandle);
        error = MemHandleResize(mChoicesHandle, textLen + choicesOffset + sizeof('\0'));
        choicesP = (CharPtr) MemHandleLock(mChoicesHandle);

        // Check for fatal error.
        ErrFatalDisplayIf(error, "Could not grow choices for popup list.");

        // Copy the text from the record to the choices buffer.
        for (i = 0; i < textLen; i++)
```

```
            choicesP[choicesOffset + i] = recordP[i];

        // Update the end of choices offset and set a zero terminator
        // on the string in the choices buffer.
        choicesOffset += textLen;
        choicesP[choicesOffset++] = 0;

        if (itemIndex != numRecords) {
            // Unlock the handle to the record.
            MemHandleUnlock(recordH);

            // Release the record, not dirty.
            DmReleaseRecord(mBookmarkDB, itemIndex, false);
        }
    }
}
/************************************************************************
 *
 * FUNCTION:        editFormListDrawItem
 *
 * DESCRIPTION:     Draw an item in the edit form's list.  This routine is
 *                      called from LstDrawList once for each item in the list.
 *
 *
 * PARAMETERS:      itemNum - which list item to draw
 *                      bounds - bounds in which to draw the item
 *                      itemsText - pointer to data (not used)
 *
 * RETURNED:        Nothing.
 *
 ***********************************************************************/
void BLBookmarkDB::editFormListDrawItem (UInt itemNum, RectanglePtr bounds, CharPtr
*/*itemsText*/)
{
    Handle      recHandle;
    CharPtr     recTextP;
    UInt        x;
    Int         textLen, lstWidth;
    Boolean     fits;

    // Retrieve the record from the database and lock it down.
    recHandle = (Handle)DmGetRecord(mBookmarkDB, itemNum);
    recTextP = (CharPtr) MemHandleLock(recHandle);

    // Determine the length of text that will fit within the list bounds.
    lstWidth = bounds->extent.x - 2;
    textLen = (Short) StrLen(recTextP);
    FntCharsInWidth(recTextP, &lstWidth, &textLen, &fits);

    // Now draw the text from the record.
    x = (UInt) bounds->topLeft.x;
    WinDrawChars(recTextP, (Word) textLen, (SWord) x, bounds->topLeft.y);

    // Unlock the handle to the record.
    MemHandleUnlock(recHandle);

    // Release the record, not dirty.
    DmReleaseRecord(mBookmarkDB, itemNum, false);
}

/************************************************************************
 *
 * FUNCTION:        getFirstUrlMatch
 *
 * DESCRIPTION:     Retrieves the first element in the database that matches
 *                      the given string. called from LstDrawList once for each item in the
list.
 *
 * PARAMETERS:      urlP - url to match
 *
 * RETURNED:        CharPtr to url string or null if none.
 *
 ***********************************************************************/
```

```
CharPtr BLBookmarkDB::getFirstUrlMatch(CharPtr urlP)
{

    Handle  recordH;
    CharPtr recordP;
    Int i, textLen;
    CharPtr matchP = NULL;
    Boolean found = false;

    // iterate backwards to effectively search from top down (as displayed)
    for (i = (Int)(getNumRecords() - 1); i >= 0; i--)
    {
        recordH = (Handle) DmGetRecord(mBookmarkDB, (UInt) i);
        recordP = (CharPtr) MemHandleLock(recordH);

        textLen = (Short) StrLen(recordP);
        // advance to the url
        recordP += (textLen + 1);

        if (recordP) {
            if (StrNCompare (recordP, urlP, StrLen(urlP)) == 0) {
                found = true;
                matchP = BLUtils::cloneString(recordP);
            }
        }

        // Unlock the handle to the record.
        MemHandleUnlock(recordH);

        // Release the record, not dirty.
        DmReleaseRecord(mBookmarkDB, (UShort) i, false);

        if (found) break;
    }
    if (matchP) return matchP;
    return NULL;
}
#pragma once

#include "BLUtils.h"

static DmOpenRef        mBookmarkDB;        // handle for database

class BLBookmarkDB
{
    public:

        BLBookmarkDB();
        ~BLBookmarkDB();

        UInt            getCurrentRecord(void);
        void            setCurrentRecord(Word index);

        Boolean         isValidRecord(void);
        UInt            getNumRecords(void);

        void            openBookmarkDB(void);
        void            closeBookmarkDB(void);
        void            saveBookmarkRecord (Word nameFieldID, Word urlFieldID, Boolean
isNewRecord, Boolean isCached);
        void            loadBookmarkRecord (Word nameField, Word urlField, Word checkboxID);
        void            getUrlForRecord (Word index, CharPtr& urlP);
        void            deleteCurrentRecord (void);

        void            constructPopupListArray (UInt itemIndex, UInt numRecords, UInt
lstWidth,                                       VoidHand& mChoicesHandle, CharPtr& choicesP);

        // Drawing callback functions
        static void         editFormListDrawItem (UInt itemNum, RectanglePtr bounds, CharPtr
*itemsText);
        static void         popupListDrawItem (UInt itemNum, RectanglePtr bounds, CharPtr
*itemsText);

        // auto complete
        CharPtr         getFirstUrlMatch(CharPtr urlP);
```

```
    protected:
            /* Application database management defines. */
            ULong           mBookmarkAppType;       // type for application.  must be 4 chars,
mixed case.
            ULong           mBookmarkDBType;        // type for application database.  must be 4
chars, mixed case.
            CharPtr         mBookmarkDBName;        // name for application database.  up to 31
characters.

            Word            mCurrentRecord;         // index of current database record
            enum {          kNoRecordSelected = -1 }; // index for no current record.
            CharPtr         kEditBookmarksCommand;

};// BLCWrappers.c

/**
    Implements standard C lib calls in terms of PalmOS
*/

void * malloc(unsigned long size)
{
    return MemPtrNew(size);
}


void * realloc(void * ptr, unsigned long size)
{
    Err err = MemPtrResize(ptr, size);

    if(err == 0)
        return ptr;
    else
        return NULL;
}

void * calloc(unsigned long nmemb, unsigned long size)
{
    unsigned long numBytes = nmemb * size;
    void * newMem = malloc(numBytes);

    MemSet(newMem, numBytes, 0);

    return newMem;
}


void free(void * ptr)
{
    if(ptr != NULL)
        MemPtrFree(ptr);
}


int memcmp(const void * src1, const void * src2, unsigned long n)
{
    return MemCmp(src1, src2, n);
}


void * memset(void * dst, int val, unsigned long n)
{
    MemSet(dst, (ULong) n, (Byte) val);

    return dst;
}

// BLCWrappers.cpp

#include <size_t.h>

void * malloc(unsigned long size)
{
    return MemPtrNew(size);
```

```
}

void free(void * ptr)
{
    MemPtrFree(ptr);
}// BLCacheDB.cpp

#include "BLCacheDB.h"
#include "BrowserApp.h"

BLCacheDB::BLCacheDB()
{
    mCurrentRecord = -1;
}


BLCacheDB::~BLCacheDB()
{
    DmDeleteDatabase(0, mDBID);
}


void
BLCacheDB::open()
{
    BLDatabase::open(BrowserApp::appFileCreator, 'cach', "BLCache", dmModeReadWrite, true);
}


CharPtr
BLCacheDB::newRecord(   BLVector<BLHistoryItem *, kHistorySize> & pageHistory,
                        int currPage)
{
    OpenCacheRecord * cacheRecordP = new OpenCacheRecord();

    if(cacheRecordP == NULL)
        throw OutOfMemoryException();

    cacheRecordP->mHandle = NULL;
    cacheRecordP->mPhysicalSize = 64000;
    cacheRecordP->mLogicalSize = 0;
    cacheRecordP->mIndex = (Word) -1;
    cacheRecordP->mRelease = true;
    cacheRecordP->mDelete = true;

    VoidHand openRecordHandle;
    Word index;

    for(int i=0; i<2; i++)
    {
        index = dmMaxRecordIndex;
        openRecordHandle = DmNewRecord(mRef, &index, cacheRecordP->mPhysicalSize);

        if(openRecordHandle != NULL)
        {
            return addToCache(cacheRecordP, openRecordHandle, index);
        }

        cleanCache(pageHistory, currPage, i);
    }

    while(true)
    {
        index = dmMaxRecordIndex;
        openRecordHandle = DmNewRecord(mRef, &index, cacheRecordP->mPhysicalSize);

        if(openRecordHandle != NULL)
        {
            return addToCache(cacheRecordP, openRecordHandle, index);
        }

        cacheRecordP->mPhysicalSize /= 2;
        if(cacheRecordP->mPhysicalSize == 0)
            break;
    }
```

```
    cacheRecordP->mPhysicalSize = 0;
    delete cacheRecordP;

    return NULL;
}


CharPtr
BLCacheDB::addToCache(OpenCacheRecord * recordP, VoidHand handle, Word index)
{
    recordP->mHandle = handle;
    recordP->mIndex = index;

    mCurrentRecord = mOpenRecords.getNumElements();
    mOpenRecords.add(recordP);

    recordP->mData = (CharPtr) MemHandleLock(handle);

    return recordP->mData;
}


CharPtr
BLCacheDB::checkInCurrent(bool canMove)
{
    if(mCurrentRecord == -1)
        return NULL;

    OpenCacheRecord * recordP = mOpenRecords[mCurrentRecord];

    recordP->mDelete = false;

    if(canMove)
    {
        MemHandleUnlock(recordP->mHandle);
        recordP->mHandle = DmResizeRecord(mRef, recordP->mIndex, recordP->mLogicalSize);
        recordP->mPhysicalSize = recordP->mLogicalSize;
        mTotalCacheSize += recordP->mLogicalSize;

        recordP->mData = (CharPtr) MemHandleLock(recordP->mHandle);

        return recordP->mData;
    }

    return NULL;
}


void
BLCacheDB::removeCurrent()
{
    if(mCurrentRecord == -1)
        return;

    OpenCacheRecord * recordP = mOpenRecords[mCurrentRecord];

    MemHandleUnlock(recordP->mHandle);

    if(recordP->mRelease)
        DmReleaseRecord(mRef, recordP->mIndex, true);

    decrementRecords(recordP->mIndex);
    DmRemoveRecord(mRef, recordP->mIndex);

    delete mOpenRecords.remove(mCurrentRecord);

    mCurrentRecord = -1;
}


bool
BLCacheDB::growRecord(UInt newSize)
{
```

```
    if(mCurrentRecord == -1)
        return false;

    mOpenRecords[mCurrentRecord]->mLogicalSize = newSize;

    if(newSize > mOpenRecords[mCurrentRecord]->mPhysicalSize)
        return false;
    else
        return true;
}


void
BLCacheDB::decrementRecords(UInt index)
{
    BLIterator<OpenCacheRecord *, kIncrement> iter(mOpenRecords);

    while(iter.hasNext())
    {
        OpenCacheRecord * recordP = iter.getNext();

        if(recordP->mIndex > index)
            recordP->mIndex--;

}


OpenCacheRecord *
BLCacheDB::isRecordOpen(CharPtr url, Word index)
{
    BLIterator<OpenCacheRecord *, kIncrement> iter(mOpenRecords);

    while(iter.hasNext())
    {
        OpenCacheRecord * recordP = iter.getNext();

        if(url && recordP->mData)
        {
            if(StrCompare(url, recordP->mData) == 0)
                return recordP;
        }
        else if(recordP->mIndex == index)
            return recordP;
    }

    return NULL;
}



v
B     eDB::closeRecords()
{
    while(mOpenRecords.getNumElements() > 0)
    {
        OpenCacheRecord * recordP = mOpenRecords[0];

        MemHandleUnlock(recordP->mHandle);

        if(recordP->mRelease)
        {
            if(!recordP->mDelete)
            {
                DmResizeRecord(mRef, recordP->mIndex, recordP->mLogicalSize);
                mTotalCacheSize += recordP->mLogicalSize;
            }

            DmReleaseRecord(mRef, recordP->mIndex, true);
        }

        if(recordP->mDelete)
        {
            decrementRecords(recordP->mIndex);
            DmRemoveRecord(mRef, recordP->mIndex);
        }
```

```
        delete mOpenRecords.remove(0);
    }

    mCurrentRecord = -1;

    mOpenRecords.deleteAll();
}


ULong
BLCacheDB::findRecord(CharPtr url, CharPtr &cacheEntry)
{
    UInt numRecords = DmNumRecords(mRef);
    UInt dbIndex = 0;

    // first see it's already open, then look it cache.

    OpenCacheRecord * cacheRecordP = isRecordOpen(url, 0);

    if((cacheRecordP != NULL) && (cacheRecordP->mPhysicalSize > 0))
    {
        cacheEntry = cacheRecordP->mData;
        return cacheRecordP->mPhysicalSize;
    }

    for(UShort dbIndex=0; dbIndex < numRecords; dbIndex++)
    {
        Handle charHandle = (Handle) DmQueryRecord(mRef, dbIndex);

        if(charHandle == NULL)
            continue;

        CharPtr string = (CharPtr) MemHandleLock(charHandle);

        if(StrCompare(string, url) == 0)
        {
            cacheRecordP = new OpenCacheRecord();

            if(cacheRecordP == NULL)
                throw OutOfMemoryException();

            cacheRecordP->mHandle = charHandle;
            cacheRecordP->mLogicalSize = cacheRecordP->mPhysicalSize = MemPtrSize(string);
            cacheRecordP->mIndex = dbIndex;
            cacheRecordP->mRelease = false;
            cacheRecordP->mDelete = false;
            cacheRecordP->mData = string;

            cacheEntry = string;

            mOpenRecords.add(cacheRecordP);

            return cacheRecordP->mPhysicalSize;
        }

        MemHandleUnlock(charHandle);
    }

    cacheEntry = NULL;

    return 0;
}


void
BLCacheDB::cleanCache( BLVector<BLHistoryItem *, kHistorySize> & pageHistory,
                       int currPage,
                       int attempt)
{
    UInt numRecords = DmNumRecords(mRef);
    UInt dbIndex = 0;

    for(UShort dbIndex=0; dbIndex < numRecords; dbIndex++)
    {
```

```
        if(isRecordOpen(NULL, dbIndex) != NULL)
            continue;

        Handle charHandle = (Handle) DmQueryRecord(mRef, dbIndex);

        if(charHandle == NULL)
            continue;

        CharPtr string = (CharPtr) MemHandleLock(charHandle);

        BLIterator<BLHistoryItem *, kHistorySize> iter(pageHistory);

        bool keep = false;

        if(attempt == 0)
        {
            int pos = 0;

            while(iter.hasNext())
            {
                BLHistoryItem * item = iter.getNext();

                if(StrCompare(item->getURL(), string) == 0)
                {
                    if(pos < currPage)
                    {
                        keep = true;
                        break;
                    }
                }

                pos++;
            }
        }

        MemHandleUnlock(charHandle);

        if(!keep)
        {
            decrementRecords(dbIndex);
            DmRemoveRecord(mRef, dbIndex);
            dbIndex--;
        }
    }
}

// BLCacheDB.h

#pragma once

#include "BLDatabase.h"
#     \de "BLVector.h"
#     .de "WMLState.h"


class OpenCacheRecord
{
    public:

        VoidHand    mHandle;
        CharPtr     mData;
        ULong       mPhysicalSize;
        ULong       mLogicalSize;
        Word        mIndex;
        bool        mRelease;
        bool        mDelete;
};


class BLCacheDB : public BLDatabase
{
    public:

        enum {  kHistorySize = 20, kIncrement = 4 };
```

```
                                BLCacheDB();
                    virtual     ~BLCacheDB();

                virtual void    open();

                        CharPtr newRecord(  BLVector<BLHistoryItem *, kHistorySize> & pageHistory,
                                            int currPage);
                        bool    growRecord(UInt newSize);
                        void    closeRecords();

                        ULong   findRecord(CharPtr url, CharPtr &cacheEntry);

                        Word    bytesLeft() { return
(Word)mOpenRecords[mCurrentRecord]->mPhysicalSize -

(Word)mOpenRecords[mCurrentRecord]->mLogicalSize; }

                        CharPtr addToCache(OpenCacheRecord * recordP, VoidHand handle, Word index);

                        CharPtr checkInCurrent(bool canMove = false);
                        void    removeCurrent();

        protected:

                        OpenCacheRecord *   isRecordOpen(CharPtr url, Word index);

                        void    decrementRecords(UInt index);

                        BLVector<OpenCacheRecord *, kIncrement>    mOpenRecords;

                        void    cleanCache( BLVector<BLHistoryItem *, kHistorySize> & pageHistory,
                                            int currPage,
                                            int attempt);

                        ULong       mTotalCacheSize;
                        int         mCurrentRecord;
};

// BLDatabase.cpp

#include "BLDatabase.h"


void
BLDatabase::open(   ULong appType,
                    ULong dBType,
                    CharPtr dbName,
                    UInt mode,
                    bool deleteExisting)
{
    Err     error;          // error code
    UInt    cardNo;         // card containing the application database
    UInt    dbAttrs;

    // Find the bookmark database.
    mRef = DmOpenDatabaseByTypeCreator(dBType, appType, mode);

    if(deleteExisting && mRef)
    {
        error = DmOpenDatabaseInfo(mRef, &mDBID, NULL, NULL, &cardNo, NULL);

        DmCloseDatabase(mRef);
        DmDeleteDatabase(0, mDBID);

        mRef = NULL;
    }

    if(!mRef)
    {
        //  The database doesn't exist, create it now.
        error = DmCreateDatabase(0, dbName, appType, dBType, false);

        // Check for fatal error.
        ErrFatalDisplayIf(error, "Could not create new docs database.");
```

```
        // Find the application's database.
        mRef = DmOpenDatabaseByTypeCreator(dBType, appType, mode);

        // Get info about the database
        error = DmOpenDatabaseInfo(mRef, &mDBID, NULL, NULL, &cardNo, NULL);

        // Check for fatal error.
        ErrFatalDisplayIf(error, "Could not get database info.");

        // Get attributes for the database
        error = DmDatabaseInfo(0, mDBID, NULL, &dbAttrs, NULL, NULL, NULL, NULL, NULL, NULL,
NULL, NULL, NULL);

        // Check for fatal error.
        ErrFatalDisplayIf(error, "Could not get database info.");
    }
}


void
BLDatabase::close()
{
    DmCloseDatabase(mRef);

    .Database.h

#pragma once

class BLDatabase
{
    public:

        virtual             ~BLDatabase() {}

        virtual void        open() = 0;

        virtual void        close();

    protected:

            void        open(   ULong   appType,
                                ULong   dBType,
                                CharPtr dbName,
                                UInt    mode = dmModeReadWrite,
                                bool    deleteExisting = false);

            DmOpenRef   mRef;
            LocalID     mDBID;

};// BLEventHandler.h

    ma once

class BLEventHandler
{
    public:

        enum EventClasses { kFormType, kMenuType, kUIType };

        virtual bool        doesHandleType(EventClasses /*event*/) { return false; }
        virtual bool        doesHandleObject(Word /*objectID*/) { return false; }

        virtual Boolean     handleEvent(EventPtr eventP) = 0;

};// BLForm.cpp

#include "BLForm.h"
#include "BLIterator.h"
#include "BLUtils.h"

BLForm::BLForm(UInt supportedFormID)
{
    mSupportedFormID = supportedFormID;
    mFocus = NULL;
}
```

```
BLForm::~BLForm()
{
}


void
BLForm::formLoad(FormPtr formP)
{
    mFormPtr = formP;
}


void
BLForm::formOpen()
{
    draw();
}


void
BLForm::formClose()
{
}


Boolean
BLForm::handleEvent(EventPtr eventP)
{
    Boolean handled = false;

    if(mFocus != NULL)
    {
        handled = mFocus->handleEvent(eventP);
    }

    return handled;
}


void
BLForm::draw()
{
    BLIterator<BLView *, kViewsInc> iter(mViews);

    while(iter.hasNext())
    {
        iter.getNext()->draw();
    }
}


void
BLForm::addView(BLView * view)
{
    mViews.add(view);
}


VoidPtr
BLForm::getObjectPtr(Word objectID)
{
    return FrmGetObjectPtr(mFormPtr, FrmGetObjectIndex(mFormPtr, objectID));
}


void
BLForm::setTitle(CharPtr newTitle)
{
    RectangleType originalRect;
    WinGetClip(&originalRect);
    WinResetClip();
```

```
    CharPtr oldTitle = FrmGetTitle(FrmGetActiveForm());
    FrmSetTitle(FrmGetActiveForm(), BLUtils::cloneString(newTitle));
    delete[] oldTitle;

    WinSetClip(&originalRect);
}


void
BLForm::refreshFormPointer()
{
    mFormPtr = FrmGetActiveForm();
}
// BLForm.h

#pragma once

#include "BLEventHandler.h"
#include "BLView.h"
#include "BLVector.h"

class BLForm : public BLEventHandler
{
    ¬ublic:

        enum { kViewsInc = 4 };

                        BLForm(UInt supportedFormID);
        virtual         ~BLForm();

        virtual void    formLoad(FormPtr formP);
        virtual void    formOpen();
        virtual void    formClose();

                VoidPtr getObjectPtr(Word objectID);
                FormPtr getFormPtr() { return mFormPtr; }

        virtual bool    doesHandleType(EventClasses event)
                        { return event == kFormType; }

        virtual bool    doesHandleObject(Word objectID)
                        { return objectID == mSupportedFormID; }

        virtual Boolean handleEvent(EventPtr eventP);

        virtual void    draw();
        virtual void    addView(BLView * view);

        static  void    setTitle(CharPtr newTitle);

                void    refreshFormPointer();

      rotected:

                BLVector<BLView*, kViewsInc>   mViews;

                BLView*     mFocus;

                FormPtr     mFormPtr;
                Word        mSupportedFormID;
};// BLGlyph.cpp

#include "BLGlyph.h"
#include "BLUtils.h"
#include "BLWMLSession.h"
#include "BLWMLTable.h"
#include "BLWMLActions.h"
#include "BLWMLInput.h"

const int kItalicInterval = 2;

BLMemoryManager
BLGlyph::sMemManager;

BLWMLSession *
```

```
BLGlyph::sSession = NULL;

WMLAction *
BLGlyph::sClickedAction = NULL;

BLVector<RectangleType, 4>
BLGlyph::sActiveRectVector(0);

BLGlyph::HiliteAction
BLGlyph::sHiliteAction = kFindSelection;

BLGlyph::BLGlyph(BLGlyph * parent)
{
    if(parent && parent->children())
        parent->children()->add(this);
}


void
BLGlyph::setMemoryManagers()
{
    // !!! Make sure you gott'em all !!!
    BLVector<BLGlyph*, kChildrenInc>::setMemManager(&sMemManager);
    BLVector<WMLDo*, kChildrenInc>::setMemManager(&sMemManager);
    BLVector<WMLImage*, kChildrenInc>::setMemManager(&sMemManager);
    BLVector<TextState, kChildrenInc>::setMemManager(&sMemManager);
}


void *
BLGlyph::operator new(size_t size)
{
    return sMemManager.newChunk(size);
}


void
BLGlyph::operator delete(void *, size_t)
{
}


RectangleType
BLGlyph::getBounds(const Point topLeft)
{
    RectangleType rect;

    rect.topLeft = topLeft;
    rect.extent = getExtent();

    return rect;
}


bool
BLGlyph::intersects(Point topLeft, PointType p)
{
    const RectangleType &  bounds = getBounds(topLeft);

    Point pt(p);
    return pt.isInside(bounds);
}



Point
BLGlyph::getExtent(const Point &areaExtent)
{
    if(children() == NULL)
        return Point::sZeroPoint();

    BLIterator<BLGlyph*, kChildrenInc> iter(*children());

    Point totalExtent;
```

```
    while(iter.hasNext())
    {
        BLGlyph * element = iter.getNext();

        Point extent = element->getExtent(areaExtent);

        totalExtent.y += extent.y;

        if(extent.x > totalExtent.x)
            totalExtent.x = extent.x;
    }

    return totalExtent;
}


bool
BLGlyph::drawOrClick(   const RectangleType & displayArea,
                        const Point &offset,
                        PointType p,
                        bool isDraw)
{
    if(children() == NULL)
        return false;

    BLIterator<BLGlyph*, kChildrenInc> iter(*children());

    RectangleType areaLeft = displayArea;
    Point remainingOffset = offset;

    while(iter.hasNext())
    {
        BLGlyph * child = iter.getNext();

        int height = child->getExtent().y;

        if(remainingOffset.y > height)
        {
            remainingOffset.y -= height;
            continue;
        }

        if(isDraw)
            child->draw(areaLeft, remainingOffset);
        else
        {
            if(child->click(areaLeft, remainingOffset, p))
                return true;
        }

        Point extent = child->getExtent(displayArea.extent);

        areaLeft.topLeft.y += extent.y - remainingOffset.y;
        areaLeft.extent.y -= extent.y - remainingOffset.y;

        remainingOffset.y = 0;

        if(areaLeft.extent.y <= 0)
            break;
    }

    return false;
}


void
BLGlyph::draw(const RectangleType & displayArea, const Point &offset)
{
    drawOrClick(displayArea, offset, Point::sZeroPoint(), true);
}


bool
BLGlyph::click( const RectangleType & displayArea,
```

```
                const Point &offset,
                PointType p)
{
    return drawOrClick(displayArea, offset, p, false);
}


CharPtr
BLGlyph::cloneString(CharPtr str)
{
    if(str == NULL)
        return NULL;

    CharPtr copy = (CharPtr) sMemManager.newChunk(sizeof(Char) * (StrLen(str) + 1));

    return StrCopy(copy, str);
}


void
BLGlyph::flushAll()
{
    WMLLine::sUnusedLines.deleteAll();
    WMLTextRun::sUnusedRuns.deleteAll();

    sMemManager.flushAll();
}


RectangleType
BLGlyph::getArea(const RectangleType & displayArea, const Point &offset)
{
    PointType topLeft = displayArea.topLeft;
    RectangleType rect = getBounds(topLeft);
    RectUtils::shrink(rect, offset);

    if(displayArea.extent.x < rect.extent.x)
        rect.extent.x = displayArea.extent.x;
    if(displayArea.extent.y < rect.extent.y)
        rect.extent.y = displayArea.extent.y;

    return rect;
}


WMLRoot::WMLRoot()
:   BLParentGlyph(NULL),
    mNamedActions(0)
{
    mActiveCard = NULL;
    mDefaultCard = NULL;
    mTemplate = NULL;

    mDomainAccess = NULL;
    mPathAccess = NULL;
}


void
WMLRoot::draw(const RectangleType & displayArea, const Point &offset)
{
    if(mDefaultCard == NULL)
    {
        BLIterator<BLGlyph*, kChildrenInc> iter(*children());

        while(iter.hasNext())
        {
            BLGlyph * child = iter.getNext();
            WMLCard * card = dynamic_cast<WMLCard *>(child);

            if(card != NULL)
            {
                mDefaultCard = card;
```

```
                mDefaultCard->activate();
                break;
            }
        }
    }

    if(mActiveCard == NULL)
        mActiveCard = mDefaultCard;

    if(mActiveCard)
        mActiveCard->draw(displayArea, offset);

    TextState::enableBasicState();
}


bool
WMLRoot::click( const RectangleType & displayArea,
                const Point &offset,
                PointType p)
{
    if(mActiveCard)
        return mActiveCard->click(displayArea, offset, p);

     eturn false;
}


Point
WMLRoot::getExtent(const Point &areaExtent)
{
    if(mActiveCard)
        return mActiveCard->getExtent(areaExtent);
    else
    {
        Point zero(0, 0);

        return zero;
    }

    TextState::enableBasicState();
}


void
WMLRoot::addAction(WMLDo * doP)
{
    mNamedActions.add(doP);
}



   ,ot::goToCard(CharPtr cardID)
{
    BLIterator<BLGlyph*, kChildrenInc> iter(mChildren);

    if(cardID == NULL)
    {
        if(mActiveCard != mDefaultCard)
            mActiveCard->deactivate();
        else
            return true;

        mActiveCard = mDefaultCard;
        mActiveCard->activate();
        return true;
    }

    while(iter.hasNext())
    {
        BLGlyph * glyph = iter.getNext();
        WMLCard * card = dynamic_cast<WMLCard *>(glyph);

        if((card != NULL) && (card->mID != NULL))
        {
```

```
            if(StrCompare(cardID, card->mID) == 0)
            {
                if(mActiveCard == card)
                    return true;

                if(mActiveCard)
                    mActiveCard->deactivate();

                mActiveCard = card;
                mActiveCard->activate();
                return true;
            }
        }
    }

    return false;
}


void
WMLRoot::onEnterEvent(NavigationAction lastAction)
{
    if(mActiveCard)
    {
        mActiveCard->onEnterEvent(lastAction);
    }
}


WMLCard::WMLCard()
:   mNamedActions(0)
{
    mNewContext = false;
    mID = NULL;
    mTitle = NULL;
    mIsTitleSet = false;
    mIsOrdered = true;
}


WMLCard::WMLCard(BLGlyph * parent, const WMLCard & original, WMLRoot * root)
:   BLParentGlyph(parent),
    mNamedActions(root->getNamedActions()),
    mEvents()
{
    mNewContext =   original.mNewContext;
    mID =           original.mID;
    mTitle =        original.mTitle;
    mIsTitleSet =   original.mIsTitleSet;
    mIsOrdered =    original.mIsOrdered;
    mTimer =        NULL;
}


void
WMLCard::addAction(WMLDo * doP)
{
    BLIterator<WMLDo*, kChildrenInc> iter(mNamedActions);
    int i=0;

    // So we've inherited zero or more actions from the template
    // defined at the top of the deck. If this added action has the
    // same name as one those actions, replace the original.
    // Otherwise, append.

    // !!! replace the whole thing with a hashtable someday, maybe...

    if(doP->mName != NULL)
    {
        while(iter.hasNext())
        {
            WMLDo* wmldo = iter.getNext();

            if(wmldo->mName != NULL)
            {
```

```
            if(StrCompare(wmldo->mName, doP->mName) == 0)
            {
                mNamedActions.replace(doP, i);
                return;
            }
        }
        ++i;
    }
  }

  mNamedActions.add(doP);
}


void
WMLCard::draw(const RectangleType & displayArea, const Point &offset)
{
    if(!mIsTitleSet)
    {
        CharPtr oldTitle = FrmGetTitle(FrmGetActiveForm());
        CharPtr newTitle = mTitle;

        if(newTitle == NULL)
            newTitle = BLUtils::cloneString("Blazer");
        else
        {
            FntSetFont(boldFont);
            Word length = FntWordWrap(newTitle, 78);
            FntSetFont(stdFont);

            if(length == StrLen(newTitle))
                newTitle = BLUtils::cloneString(newTitle);
            else
            {
                CharPtr tempTitle = new Char[length + 4];

                if(tempTitle == NULL)
                    throw OutOfMemoryException();

                StrNCopy(tempTitle, newTitle, length);
                newTitle = tempTitle;
                newTitle[length++] = '.';
                newTitle[length++] = '.';
                newTitle[length++] = '.';
                newTitle[length] = '\0';
            }
        }

        RectangleType originalRect;

        WinGetClip(&originalRect);
        WinResetClip();

        FrmSetTitle(FrmGetActiveForm(), newTitle);

        WinSetClip(&originalRect);

        delete[] oldTitle;
        mIsTitleSet = true;
    }

    BLGlyph::draw(displayArea, offset);
}


void
WMLCard::activate()
{
    if(mTimer)
        mTimer->start();
}

void
WMLCard::deactivate()
{
```

```
    if(mTimer)
        mTimer->stop();

    mIsTitleSet = false;
}


void
WMLCard::doneParsing()
{
    BLIterator<WMLDo*, kChildrenInc> iter(mNamedActions);

    if(!iter.hasNext())
        return;

    WMLParagraph * doParagraph = new WMLParagraph(this);

    if(doParagraph == NULL)
        throw OutOfMemoryException();

    TextState state;
    state.underline = grayUnderline;

    if(new WMLBreak(doParagraph) == NULL)
        throw OutOfMemoryException();

    bool hasButton = false;

    while(iter.hasNext())
    {
        WMLDo * doElem = iter.getNext();

        if(doElem->getAction() != NULL)
        {
            hasButton = true;

            state.action = doElem;

            CharPtr itemName = doElem->mLabel;

            if(itemName == NULL)
                itemName = "Unknown Action";

            new WMLButton( doParagraph,
                           itemName,
                           (int) StrLen(itemName),
                           state);
        }
    }

    if(hasButton)
        new WMLBreak(doParagraph);
}


void
WMLCard::onEnterEvent(NavigationAction lastAction)
{
    switch(lastAction)
    {
        case kGoBack:
            if(mEvents.mOnEnterBackward)
                mEvents.mOnEnterBackward->activate();
            break;

        default:
            if(mEvents.mOnEnterForward)
                mEvents.mOnEnterForward->activate();
            break;
    }
}
```

```
WMLParagraph::WMLParagraph(BLGlyph * parent)
:   BLParentGlyph(parent),
    mLines()
{
    bits.mFlowDone = false;
    bits.mIsWrapOn = true;
    mAlign = kLeft;

    bits.mIsExtentCached = false;
    mTotalExtent.x = mTotalExtent.y = 0;

    mFlowVars = NULL;
}


WMLParagraph::WMLParagraph(BLGlyph * parent, const WMLParagraph &original)
:   BLParentGlyph(parent)
{
    bits.mFlowDone = false;
    bits.mIsExtentCached = false;
    mFlowVars = NULL;

    bits.mIsWrapOn = original.bits.mIsWrapOn;
     Align = original.mAlign;



void
WMLParagraph::draw(const RectangleType & displayArea, const Point &offset)
{
    drawOrClick(displayArea, offset, Point::sZeroPoint(), true);
}


bool
WMLParagraph::click(const RectangleType & displayArea,
                    const Point &offset,
                    PointType p)
{
    return drawOrClick(displayArea, offset, p, false);
}


void
WMLParagraph::needsReflow()
{
    bits.mFlowDone = false;
    bits.mIsExtentCached = false;

    // salvage the memory:
    BLIterator<BLGlyph*, kChildrenInc> iter(*mLines.children());

    while(iter.hasNext())
    {
        WMLLine * line = dynamic_cast<WMLLine *>(iter.getNext());

        if(line != NULL)
        {
            BLIterator<BLGlyph*, kChildrenInc> lineIter(*line->children());

            while(lineIter.hasNext())
            {
                BLGlyph * glyph = lineIter.getNext();

                if(dynamic_cast<WMLTextRun *>(glyph) != NULL)
                {
                    WMLTextRun::sUnusedRuns.add((WMLTextRun *) glyph);
                }
            }

            WMLLine::sUnusedLines.add(line);
        }
    }

    mLines.children()->removeAll();
```

```
}

bool
WMLParagraph::drawOrClick(  const RectangleType & displayArea,
                            const Point &offset,
                            PointType p,
                            bool isDraw)
{
    PointType areaExtent = displayArea.extent;
    flow(areaExtent);

    BLIterator<BLGlyph*, kChildrenInc> iter(*mLines.children());
    RectangleType areaLeft = displayArea;
    Point remainingOffset = offset;

    while(iter.hasNext())
    {
        WMLLine * element = dynamic_cast<WMLLine *>(iter.getNext());

        LineMetrics metrics = element->getMetrics();
        int height = metrics.height();

        if(remainingOffset.y > height)
        {
            remainingOffset.y -= height;
            continue;
        }

        if(isDraw)
            element->draw(areaLeft, remainingOffset);
        else
        {
            if(element->click(areaLeft, remainingOffset, p))
                return true;
        }

        if(remainingOffset.y > 0)
        {
            areaLeft.topLeft.y += height - remainingOffset.y;
            areaLeft.extent.y -= height - remainingOffset.y;

            remainingOffset.y -= height;

            if(remainingOffset.y < 0)
                remainingOffset.y = 0;
        }
        else
        {
            areaLeft.topLeft.y += height;
            areaLeft.extent.y -= height;
        }

        if(areaLeft.extent.y <= 0)
            break;
    }

    flow(areaExtent);

    return false;
}


Point
WMLParagraph::getExtent()
{
    BLIterator<BLGlyph*, kChildrenInc> iter(*mLines.children());

    if(bits.mIsExtentCached)
        return mTotalExtent;

    Point totalExtent;

    while(iter.hasNext())
    {
```

```
        WMLLine * element = dynamic_cast<WMLLine *>(iter.getNext());

        Point extent = element->getExtent();

        totalExtent.y += extent.y;

        if(extent.x > totalExtent.x)
            totalExtent.x = extent.x;
    }

    if(bits.mFlowDone)
    {
        totalExtent.y += 5;

        mTotalExtent = totalExtent;
        bits.mIsExtentCached = true;
    }

    return totalExtent;
}


P
W       agraph::getExtent(const Point &areaExtent)
{
    if(areaExtent != Point::sZeroPoint())
        flow(areaExtent);

    return getExtent();
}

void
WMLParagraph::newLine(bool doComputeMetrics)
{
    if(doComputeMetrics)
        mFlowVars->mCurrentLine->computeMetrics(mFlowVars->mDefaultWidth);

    mFlowVars->mCurrentTextState.enable();
    mFlowVars->mCurrentLine = new WMLLine(&mLines, mAlign);
    mFlowVars->mWidthLeft = mFlowVars->mDefaultWidth;
}

bool
WMLParagraph::flow(const Point &areaExtent)
{
    if(bits.mFlowDone)
        return true;

    if(this == WBXMLParser::sGetCurrentNode())
        return false;

      Mimics a series of recursive calls with a stack of iterators.
      Walks tree inorder. */

    BLIteratorNode<BLGlyph*, kChildrenInc> * curIter;
    BLIteratorNode<BLGlyph*, kChildrenInc> * iter;

    if(mFlowVars == NULL)
    {
        mFlowVars = new ParagraphFlowVars();

        mFlowVars->mCurrentTextState.bits.wordWrap = bits.mIsWrapOn;
        mFlowVars->mWidthLeft = mFlowVars->mDefaultWidth = areaExtent.x;

        iter = new BLIteratorNode<BLGlyph*, kChildrenInc> (mChildren);

        mFlowVars->mIterStack = new BLStack;
        mFlowVars->mIterStack->push(iter);

        mFlowVars->mCurrentLine = new WMLLine(&mLines, mAlign);

        bits.mUnwrappedSpillOver = false;
    }
    else
    {
```

```
        if(mFlowVars->mCurrentLine == NULL)
            mFlowVars->mCurrentLine = new WMLLine(&mLines, mAlign);
    }

    mFlowVars->mCurrentTextState.enable(); // enable plain state

    while(mFlowVars->mIterStack->top() != NULL)
    {
        curIter = (BLIteratorNode<BLGlyph*, kChildrenInc> *) mFlowVars->mIterStack->pop();
        curIter->refresh();

        while(curIter->hasNext())
        {
            BLGlyph * elem = curIter->getNext();

            if(elem == WBXMLParser::sGetCurrentNode())
            {
                // this is still being parsed.

                curIter->backup();
                mFlowVars->mIterStack->push(curIter);
                mFlowVars->mCurrentLine->computeMetrics(mFlowVars->mDefaultWidth);
                return false;
            }

            if(elem->children())
            {
                if(dynamic_cast<WMLTable *>(elem) != NULL)
                {
                    if(WBXMLParser::sGetNumOpenTables() > 0)
                    {
                        curIter->backup();
                        mFlowVars->mIterStack->push(curIter);
                        mFlowVars->mCurrentLine->computeMetrics(mFlowVars->mDefaultWidth);
                        return false;
                    }

                    WMLTable * table = dynamic_cast<WMLTable *>(elem);

                    if(mFlowVars->mCurrentLine->children()->getNumElements() > 0)
                    {
                        mFlowVars->mCurrentLine->computeMetrics(mFlowVars->mDefaultWidth);
                        mFlowVars->mCurrentTextState.enable();
                        mFlowVars->mCurrentLine = new WMLLine(&mLines, mAlign);
                    }

                    mFlowVars->mCurrentLine->children()->add(table);
                    mFlowVars->mCurrentLine->computeMetrics(mFlowVars->mDefaultWidth);
                    mFlowVars->mCurrentTextState.enable();

                    Point tableExtent(mFlowVars->mDefaultWidth, 0);
                    table->flow(&mLines, tableExtent);

                    newLine(false);
                }
                else
                {
                    if(dynamic_cast<WMLSelect *>(elem) != NULL)
                    {
                        WMLSelect * selectP = dynamic_cast<WMLSelect *>(elem);

                        newLine();

                        if(selectP->getTitle())
                        {
                            WMLTextRun * textRun = new WMLTextRun( mFlowVars->mCurrentLine,
                                                                   selectP->getTitle(),
                                                                   selectP->getTitleLength(),
mFlowVars->mCurrentTextState);

                            flowText(textRun);
                            newLine();
                        }
```

```
                        if(selectP->isDisplayable())
                        {
                            // the select itself will display UI, not the children:

                            selectP->computeMetrics(mFlowVars->mWidthLeft);
                            mFlowVars->mCurrentLine->children()->add((WMLLineElement *)
selectP);

                            newLine();

                            continue;
                        }
                    }
                    else if(dynamic_cast<WMLOption *>(elem) != NULL)
                    {
                        WMLOption * optionP = dynamic_cast<WMLOption *>(elem);

                        newLine();

                        mFlowVars->mCurrentLine->children()->add(elem);
                        mFlowVars->mWidthLeft -= optionP->getExtent(areaExtent).x;

                        if(optionP->getTitleLength() > 0)
                        {
                            WMLTextRun * textRun = new WMLTextRun( mFlowVars->mCurrentLine,
                                                                   optionP->getTitle(),
                                                                   optionP->getTitleLength(),

mFlowVars->mCurrentTextState);

                            flowText(textRun);
                        }
                    }

                    iter = new BLIteratorNode<BLGlyph*, kChildrenInc> (*elem->children());

                    if(curIter->hasNext())
                    {
                        mFlowVars->mIterStack->push(curIter);
                        curIter = NULL; // make it NULL so it won't be deleted
                    }

                    mFlowVars->mIterStack->push(iter);
                    break;
                }
            }
            else
            {
                // It's a leaf, so flow it.

                if(dynamic_cast<WMLTextRun *>(elem) != NULL)
                {
                    flowText(dynamic_cast<WMLTextRun *>(elem));
                }
                else if(dynamic_cast<WMLBreak *>(elem) != NULL)
                {
                    WMLTextRun * newRun = new WMLTextRun((BLParentGlyph
*)mFlowVars->mCurrentLine, "", 0, mFlowVars->mCurrentTextState);
                    newRun->computeMetrics(mFlowVars->mWidthLeft);
                    newLine();
                }
                else if(dynamic_cast<WMLButton *>(elem) != NULL)
                {
                    WMLButton * buttonP = dynamic_cast<WMLButton *>(elem);

                    LineMetrics metrics = buttonP->getMetrics();

                    if( (metrics.width >= mFlowVars->mWidthLeft) &&
                        (metrics.width <= mFlowVars->mDefaultWidth))
                        newLine();

                    mFlowVars->mCurrentLine->children()->add((WMLLineElement *) buttonP);
                    mFlowVars->mWidthLeft -= metrics.width;
                }
                else if(dynamic_cast<WMLInput *>(elem) != NULL)
                {
```

```
                    WMLInput * inputP = dynamic_cast<WMLInput *>(elem);
                    inputP->computeMetrics(mFlowVars->mWidthLeft);
                    mFlowVars->mCurrentLine->children()->add(elem);
                    newLine();
                }
                else if(dynamic_cast<WMLFieldSet *>(elem) != NULL)
                {
                    WMLFieldSet * fieldSetP = dynamic_cast<WMLFieldSet *>(elem);

                    newLine();

                    if(fieldSetP->getTitleLength() > 0)
                    {
                        WMLTextRun * textRun = new WMLTextRun( mFlowVars->mCurrentLine,
                                                               fieldSetP->getTitle(),
                                                               fieldSetP->getTitleLength(),
                                                               mFlowVars->mCurrentTextState);
                        flowText(textRun);
                    }

                    newLine();
                }
                else if(dynamic_cast<WMLImage *>(elem) != NULL)
                {
                    WMLImage * image = dynamic_cast<WMLImage *>(elem);
                    Point extent = image->getExtent();

                    mFlowVars->mCurrentTextState.setWordWrap(bits.mIsWrapOn);

                    if(mFlowVars->mCurrentTextState.bits.wordWrap && (extent.x >
mFlowVars->mWidthLeft))
                    {
                        // Image wider than space available, so go to next line:

                        newLine();
                    }

                    if(!image->isDownloaded())
                    {
                        int altTextLen = 0;

                        if(image->getAltText() != NULL)
                            altTextLen = (int) StrLen(image->getAltText());

                        if(altTextLen > 0)
                        {
                            WMLTextRun * newRun;
                            CharPtr altText = image->getAltText();

                            if(altText[0] != '[')
                            {
                                newRun = new WMLTextRun(NULL,
                                                        "[",
                                                        1,
                                                        image->getTextState());

                                flowText(newRun);
                            }

                            newRun = new WMLTextRun(NULL,
                                                    altText,
                                                    altTextLen,
                                                    image->getTextState());

                            flowText(newRun);

                            if(altText[altTextLen - 1] != ']')
                            {
                                newRun = new WMLTextRun(NULL,
                                                        "]",
                                                        1,
                                                        image->getTextState());

                                flowText(newRun);
                            }
```

```
                    }
                }
                else
                {
                    mFlowVars->mCurrentLine->children()->add(image);

                    image->computeMetrics(mFlowVars->mDefaultWidth);

                    mFlowVars->mWidthLeft -= image->getMetrics().width;

                    if(mFlowVars->mWidthLeft < 0)
                    {
                        if(mFlowVars->mCurrentTextState.bits.wordWrap)
                            mFlowVars->mWidthLeft = 0;
                        else
                            mFlowVars->mWidthLeft = mFlowVars->mDefaultWidth;
                    }
                }
            }
        }
    }

    delete curIter;
}

 FlowVars->mCurrentLine->computeMetrics(mFlowVars->mDefaultWidth);

mFlowVars->mCurrentLine = new WMLLine(&mLines, mAlign);
LineMetrics metrics;
metrics.baselineOffset = 5;
metrics.width = mFlowVars->mDefaultWidth;
mFlowVars->mCurrentLine->setMetrics(metrics);

delete mFlowVars->mIterStack;
delete mFlowVars;

mFlowVars = NULL;

bits.mFlowDone = true;

return true;
}


void
WMLParagraph::flowText(WMLTextRun * textRun)
{
    WMLTextRun * newRun;

    mFlowVars->mCurrentTextState = textRun->getState();
    mFlowVars->mCurrentTextState.setWordWrap(bits.mIsWrapOn);
    textRun->setState(mFlowVars->mCurrentTextState);
     FlowVars->mCurrentTextState.enable();

    if(bits.mUnwrappedSpillOver && mFlowVars->mCurrentTextState.bits.wordWrap)
    {
        bits.mUnwrappedSpillOver = false;
        mFlowVars->mWidthLeft = 0;
    }

    int cursor = 0;

    bool skipLeadingSpace = mFlowVars->mCurrentLine->children()->getNumElements() == 0;

    while(  ((newRun = textRun->getNextLine((BLParentGlyph *)mFlowVars->mCurrentLine,
                                            mFlowVars->mWidthLeft,
                                            mFlowVars->mDefaultWidth,
                                            cursor,
                                            skipLeadingSpace)) != NULL) ||
            textRun->hasMoreText(cursor))
    {
        if(textRun->hasMoreText(cursor) && mFlowVars->mCurrentTextState.bits.wordWrap)
        {
            newLine();
        }
```

```
        else if(textRun->hasMoreText(cursor) && !mFlowVars->mCurrentTextState.bits.wordWrap)
        {
            mFlowVars->mWidthLeft = mFlowVars->mDefaultWidth;
            bits.mUnwrappedSpillOver = true;
        }

        skipLeadingSpace = true;
    }
}


BLVector<WMLLine *, BLGlyph::kChildrenInc>
WMLLine::sUnusedLines;


BLVector<WMLTextRun*, BLGlyph::kChildrenInc>
WMLTextRun::sUnusedRuns;


WMLLine::WMLLine(BLGlyph * parent, Alignment align)
:   WMLLineElement(parent),
    mChildren(0)
{
    mAlign = align;
    mLineWidth = 0;
}


LineMetrics
WMLLine::getMetrics()
{
    BLIterator<BLGlyph*, kChildrenInc> iter(mChildren);

    LineMetrics metrics;

    while(iter.hasNext())
    {
        WMLLineElement * element = dynamic_cast<WMLLineElement *>(iter.getNext());

        LineMetrics elemMetrics = element->getMetrics();

        metrics.width += elemMetrics.width;

        if(elemMetrics.baselineOffset > metrics.baselineOffset)
            metrics.baselineOffset = elemMetrics.baselineOffset;

        if(elemMetrics.overhang > metrics.overhang)
            metrics.overhang = elemMetrics.overhang;
    }

    if(metrics.width > mLineWidth)
        mAlign = kLeft;

    if(mAlign == kCenter)
    {
        metrics.leadingSpace = (mLineWidth - metrics.width) / 2;
        metrics.width += metrics.leadingSpace;
    }
    else if(mAlign == kRight)
    {
        metrics.leadingSpace = mLineWidth - metrics.width; // !!! not +=?
        metrics.width += metrics.leadingSpace;
    }

    return metrics;
}


bool
WMLLine::drawOrClick(  const RectangleType &   displayArea,
                       const Point &           offset,
                       PointType               p,
                       bool                    isDraw)
{
    BLIterator<BLGlyph*, kChildrenInc> iter(mChildren);
```

```
    int widthUsed = 0;
    Point remainingOffset = offset;

    LineMetrics metrics = getMetrics();

    widthUsed = metrics.leadingSpace;

    if(remainingOffset.x > widthUsed)
    {
        remainingOffset.x -= widthUsed;
        widthUsed = 0;
    }
    else
    {
        widthUsed -= remainingOffset.x;
        remainingOffset.x = 0;
    }

    int index = 0;

    while(iter.hasNext())
    {
        WMLLineElement * element = dynamic_cast<WMLLineElement *>(iter.getNext());

        LineMetrics elemMetrics = element->getMetrics();

        RectangleType rect = displayArea;

        if(remainingOffset.x > elemMetrics.width)
        {
            remainingOffset.x -= elemMetrics.width;
            continue;
        }

        rect.topLeft.x += widthUsed;
        rect.extent.x -= widthUsed;

        int baseDifference = metrics.baselineOffset - elemMetrics.baselineOffset;

        Point elemOffset = remainingOffset;

        if(elemOffset.y > 0)
        {
            if(baseDifference > elemOffset.y)
            {
                baseDifference -= elemOffset.y;
                elemOffset.y = 0;
            }
            else
            {
                elemOffset.y -= baseDifference;
                baseDifference = 0;
            }
        }

        rect.topLeft.y += baseDifference;
        rect.extent.y -= baseDifference;

        if(isDraw)
            element->draw(rect, elemOffset);
        else if(sHiliteAction == kFindSelection)
        {
            Point pt(p);
            RectangleType compareRect = rect;

            compareRect.topLeft = rect.topLeft;

            compareRect.extent = elemMetrics.getExtent();

            compareRect.extent.x -= elemOffset.x;
            compareRect.extent.y -= elemOffset.y;

            if((compareRect.extent.y > 0) && (compareRect.extent.x > 0))
                if(pt.isInside(compareRect) && element->click(rect, elemOffset, p))
```

```
                    return true;
        }
        else
        {
            if( sClickedAction && ((sClickedAction == element->getTextState().action) ||
                (sClickedAction == dynamic_cast<WMLAction*>(element))))
                element->click(rect, elemOffset, p);
        }

        if(remainingOffset.x > 0)
        {
            widthUsed += elemMetrics.width - remainingOffset.x;

            remainingOffset.x = 0;
        }
        else
        {
            widthUsed += elemMetrics.width;
        }

        if(widthUsed > displayArea.extent.x)
            break;
    }

    return false;
}


void
WMLLine::draw(const RectangleType & displayArea, const Point &offset)
{
    drawOrClick(displayArea, offset, Point::sZeroPoint(), true);
}


bool
WMLLine::click( const RectangleType & displayArea,
                const Point &offset,
                PointType p)
{
    return drawOrClick(displayArea, offset, p, false);
}


void *
WMLLine::operator new(size_t size)
{
    if(sUnusedLines.getNumElements() == 0)
        return sMemManager.newChunk(size);
    else
    {
        void * mem = sUnusedLines.removeLast();

        if(sUnusedLines.getNumElements() == 0)
            sUnusedLines.deleteAll();

        return mem;
    }
}


bool
WMLLineElement::click( const RectangleType & displayArea,
                       const Point &offset,
                       PointType /*p*/)
{
    if(mState.action != NULL)
    {
        if(sHiliteAction == kFindSelection)
        {
            sClickedAction = mState.action;

            return true;
        }
        else
```

```
        {
            RectangleType rect = getArea(displayArea, offset);

            WinInvertRectangle(&rect, 0);
            sActiveRectVector.add(rect);
        }
    }

    return false;
}


Point
WMLLineElement::getExtent()
{
    return getMetrics().getExtent();
}


void
WMLLineElement::mouseSelect()
{
    if(mState.action)
        mState.action->activate();


WMLTextRun::WMLTextRun( BLGlyph * parent,
                        CharPtr text,
                        int length,
                        const TextState &state)
:   WMLLineElement(parent)
{
    mText = text;
    mLength = length;
    mState = state;
}


WMLTextRun::WMLTextRun(BLGlyph * parent, const WMLTextRun &run)
:   WMLLineElement(parent)
{
    mText = run.mText;
    mLength = run.mLength;
    mState = run.mState;
}


void
WMLTextRun::draw(const RectangleType & displayArea, const Point &offset)
{
    'f(mLength == 0)
        return;

    mState.enable();

    LineMetrics metrics = getMetrics();

    WinDrawChars(   mText, (UShort) mLength,
                    displayArea.topLeft.x - offset.x,
                    displayArea.topLeft.y - offset.y);

    if(mState.bits.emphasis || mState.bits.italic)
    {
        RectangleType italicArea;

        italicArea.topLeft = displayArea.topLeft;
        italicArea.topLeft.x -= offset.x;
        italicArea.topLeft.y -= offset.y;

        italicArea.extent.x = metrics.width;
        italicArea.extent.y = metrics.height();

        italicize(italicArea);
    }
```

```
}
void
WMLTextRun::italicize(const RectangleType & displayArea)
{
    int height = displayArea.extent.y;
    RectangleType rect = displayArea;
    RectangleType vacated;

    int shiftAmount = height / kItalicInterval;

    for(int i=0; i < height; i+=kItalicInterval)
    {
        rect.topLeft.y = displayArea.topLeft.y + i;
        rect.extent.y = kItalicInterval;

        WinScrollRectangle(&rect, right, shiftAmount--, &vacated);
        WinEraseRectangle(&vacated, 0);
    }
}


WMLTextRun *
WMLTextRun::getNextLine(BLGlyph * parent,
                        int &pixelsAcross,
                        int maxSize,
                        int &cursor,
                        bool skipLeadingSpace)
{
    if(mText == NULL)
        return NULL;

    if(skipLeadingSpace)
    {
        while(BLUtils::isWhitespace(mText[cursor]) && (cursor < mLength))
            cursor++;
    }

    if(cursor == mLength)
        return NULL;

    ErrNonFatalDisplayIf(mText == NULL, "mText == NULL");

    LineMetrics metrics = getMetrics();
    WMLTextRun * newRun = NULL;

    SWord pixelsAllowed = pixelsAcross;
    SWord charsInLine = mLength - cursor;
    Boolean fits = false;
    int height = FntBaseLine() + FntDescenderHeight();

    if(BLUtils::isWhitespace(mText + cursor, mLength - cursor))
        fits = true;
    else
    {
        FntCharsInWidth(mText + cursor, &pixelsAllowed, &charsInLine, &fits);

        if(charsInLine == 0)
            return NULL;
    }

    if(fits)
        charsInLine = mLength - cursor;

    while(!fits || (getTextWidth(mText + cursor, charsInLine, mState, height) >
pixelsAcross))
    {
        charsInLine = backupToWhitespace(mText + cursor, charsInLine - 1);

        if((charsInLine == 0) && (maxSize == pixelsAcross))
        {   // It appears the word is wider than alloted area, so break word
            // into pieces (you come in peace, you go in pieces)
            fits = false;
            pixelsAllowed = pixelsAcross;
```

```
            charsInLine = mLength - cursor;
            FntCharsInWidth(mText + cursor, &pixelsAllowed, &charsInLine, &fits);

            if(charsInLine == 0)
                charsInLine = 1;
            break;
        }
        else if(charsInLine == 0)
            return NULL;

        fits = true;
    }

    int newCursor = cursor + charsInLine;

    newRun = new WMLTextRun(parent, *this);

    newRun->mText = mText + cursor;
    newRun->mLength = charsInLine;

    pixelsAcross -= newRun->getMetrics().width;

    cursor = newCursor;

    eturn newRun;
}


int
WMLTextRun::backupToWhitespace(CharPtr text, int length)
{
    if(length <= 0)
        return 0;

    int cur = length - 1;

    while((cur > 0) && !BLUtils::isWhitespace(text[cur]))
        cur--;

    if(!BLUtils::isWhitespace(text[cur]))
        return 0;

    // now that we found whitespace, skip it too:
    while((cur > 0) && BLUtils::isWhitespace(text[cur]))
        cur--;

    return cur + 1;
}


[illegible]eMetrics
    xtRun::getMetrics()

    mState.enable();

    LineMetrics metrics;

    metrics.baselineOffset = FntBaseLine();
    metrics.overhang = FntDescenderHeight();

    metrics.width = getTextWidth(mText, mLength, mState, metrics.height());

    return metrics;
}


int
WMLTextRun::getTextWidth(CharPtr text, int length, TextState &state, int lineHeight)
{
    int width = FntLineWidth(text, (UShort)length);

    if((length > 0) && (state.bits.italic || state.bits.emphasis))
    {
        width += lineHeight / kItalicInterval;
    }
```

```
    return width;
}


int
WMLTextRun::findLongestWord()
{
    int longest = 0;
    int lastWord = 0;
    int cursor = 1;

    int height = getMetrics().height();

    while(cursor < mLength)
    {
        if(BLUtils::isWhitespace(mText[cursor]))
        {
            int length = getTextWidth(mText + lastWord, cursor - lastWord, mState, height);

            if(longest < length)
                longest = length;

            lastWord = cursor;
        }

        cursor++;
    }

    return longest;
}


void *
WMLTextRun::operator new(size_t size)
{
    if(sUnusedRuns.getNumElements() == 0)
        return sMemManager.newChunk(size);
    else
    {
        void * mem = sUnusedRuns.removeLast();

        if(sUnusedRuns.getNumElements() == 0)
            sUnusedRuns.deleteAll();

        return mem;
    }
}


WMLImage::WMLImage(const TextState &state)
{
    mState = state;

    mSrc = NULL;
    mData = NULL;
    mAltText = NULL;
    mAlign = kBottom;

    mParentParagraph = NULL;

    mIsExtentCached = false;
    mTotalExtent.x = mTotalExtent.y = 0;
}


WMLImage::WMLImage(BLGlyph * parent, const WMLImage &original)
 :  WMLLineElement(parent)
{
    mSrc = original.mSrc;
    mAltText = original.mAltText;
    mAlign = original.mAlign;
    mSpace = original.mSpace;
```

```
    mState = original.mState;
    mData = original.mData;
    mParentParagraph = original.mParentParagraph;

    mIsExtentCached = false;
}


bool
WMLImage::isDownloaded()
{
    return mData != NULL;
}


void
WMLImage::computeMetrics(int /*lineWidth*/)
{
    Point extent = getExtent();

    mState.enable();

    mMetrics.width = extent.x;

     f(mAlign == kTop)

        mMetrics.baselineOffset = min(FntBaseLine(), extent.y);
        mMetrics.overhang = extent.y - mMetrics.baselineOffset;
    }
    else if((mAlign == kCenter) || (mAlign == kMiddle))
    {
        mMetrics.baselineOffset = extent.y / 2;
        mMetrics.overhang = extent.y - mMetrics.baselineOffset;
    }
    else if(mAlign == kBottom)
    {
        mMetrics.baselineOffset = extent.y;
        mMetrics.overhang = 0;
    }
}


void
WMLImage::draw(const RectangleType & displayArea, const Point &offset)
{
    if(mData == NULL)
    {
        return;         // !!! throw an exception, someday
    }
    else
    {
        WinDrawBitmap( mData,
                       displayArea.topLeft.x - offset.x,
                       displayArea.topLeft.y - offset.y);
    }
}


void
WMLImage::setImageData(CharPtr data)
{
    mData = (BitmapPtr) data;

    if(mParentParagraph != NULL)
        mParentParagraph->needsReflow();
}


Point
WMLImage::getExtent()
{
    Point extent(0, 0);

    if(mData == NULL)
        return extent;
```

```
    if(mIsExtentCached)
        return mTotalExtent;

    bool enough = false;

    extent.x = (Short) mData->width;
    extent.y = (Short) mData->height;

    mTotalExtent = extent;
    mIsExtentCached = true;

    return extent;
}

// BLGlyph.h

#pragma once

#include "BLTypes.h"
#include "BLVector.h"
#include "BLIterator.h"
#include "BLMemoryManager.h"
#include "WMLState.h"

class BLWMLSession;
class WMLAction;
class WMLTemplate;
class WMLDo;
class WMLTimer;

class BLGlyph
{
    public:

        enum    { kChildrenInc = 4 };
        enum    Alignment { kTop, kBottom, kCenter, kLeft, kRight, kMiddle };
        enum    HiliteAction { kFindSelection, kHilite, kUnhilite };

        virtual bool        click(  const RectangleType & displayArea,
                                    const Point &offset,
                                    PointType p);

        virtual void        draw(   const RectangleType & displayArea,
                                    const Point &offset);

                bool        drawOrClick(const RectangleType & displayArea,
                                        const Point &offset,
                                        PointType p,
                                        bool isDraw);
        virtual void        mouseSelect() {}

        virtual Point       getExtent() { return getExtent(Point::sZeroPoint()); }
        virtual Point       getExtent(const Point &areaExtent);
                RectangleType   getBounds(const Point topLeft);
                RectangleType   getArea(const RectangleType & displayArea,
                                        const Point &offset);

                void *      operator new(size_t);
                void        operator delete(void *, size_t);
        static  void *      newChunk(unsigned long size) { return sMemManager.newChunk(size);
 }

        virtual TextState   getTextState() { return TextState::getBasicState(); }

        virtual BLVector<BLGlyph*, kChildrenInc> * children()
                { return NULL; }

        static  void        flushAll();
        static  void        setSession(BLWMLSession * session) { sSession = session; }

        static  void        setMemoryManagers();

        static  WMLAction   *       sClickedAction;
        static  BLVector<RectangleType, 4> sActiveRectVector;
```

```
        static  HiliteAction        sHiliteAction;

        friend class WBXMLParser;

    protected:
                                BLGlyph(BLGlyph * parent);
                                BLGlyph() {}

        virtual bool            intersects( Point topLeft,
                                            PointType p);

        static BLWMLSession * getSession() { return sSession; }

        static  CharPtr         cloneString(CharPtr str);

        static  BLMemoryManager sMemManager;
        static  BLWMLSession *  sSession;
};

class WMLIntrinsicEvents
{
    public:

        WMLIntrinsicEvents()
        {
            mOnEnterForward = mOnEnterBackward = mOnTimer = mOnPick = NULL;
        }

        WMLAction   *   mOnEnterForward;
        WMLAction   *   mOnEnterBackward;
        WMLAction   *   mOnTimer;
        WMLAction   *   mOnPick;
};

class BLParentGlyph : public BLGlyph
{
    public:

        virtual BLVector<BLGlyph*, kChildrenInc> * children()
                { return &mChildren; }

    protected:

                                BLParentGlyph(BLGlyph * parent = NULL): BLGlyph(parent),
mChildren(0) {}
                                BLParentGlyph() : mChildren(0) {}

                BLVector<BLGlyph*, kChildrenInc>    mChildren;
};

class WMLRoot;

class WMLCard : public BLParentGlyph
{
    public:

                                WMLCard();
                                WMLCard(BLGlyph * parent, const WMLCard & original, WMLRoot *
root);

        virtual void            draw(const RectangleType & displayArea, const Point &offset);
                void            flow(const Point &areaExtent);

                void            addAction(WMLDo * doP);

                BLVector<WMLDo*, kChildrenInc> &getNamedActions() { return mNamedActions; }
                WMLIntrinsicEvents  &getIntrinsicEvents() { return mEvents; }

                void            activate();
                void            deactivate();
                void            setTimer(WMLTimer * timer) { mTimer = timer; }
```

```
        virtual void            doneParsing();
                void            onEnterEvent(NavigationAction lastAction);

            friend  class       WBXMLParser;
            friend  class       WMLRoot;

    protected:

                WMLIntrinsicEvents mEvents;
                BLVector<WMLDo*, kChildrenInc> mNamedActions;

                CharPtr     mID;
                CharPtr     mTitle;

                WMLTimer *  mTimer;

                bool        mIsTitleSet;
                bool        mIsOrdered;
                bool        mNewContext;
};
class WMLRoot : public BLParentGlyph
{
    public:

                                WMLRoot();

        virtual void            draw(const RectangleType & displayArea, const Point &offset);
        virtual bool            click(  const RectangleType & displayArea,
                                        const Point &offset,
                                        PointType p);
        virtual Point           getExtent(const Point &areaExtent);

        friend  class           WBXMLParser;

                void            addAction(WMLDo * doP);

                BLVector<WMLDo*, kChildrenInc> &getNamedActions() { return mNamedActions; }

                bool            goToCard(CharPtr cardID);

                CharPtr         getActiveCardID() { if(mActiveCard) return mActiveCard->mID;
                                                    else return NULL; }

                void            onEnterEvent(NavigationAction lastAction);

    protected:

                WMLCard *       mDefaultCard;
                WMLCard *       mActiveCard;
                WMLTemplate *   mTemplate;

                CharPtr     mDomainAccess;
                CharPtr     mPathAccess;

                BLVector<WMLDo*, kChildrenInc> mNamedActions;
};

class WMLGlyphContainer : public BLParentGlyph
{
    public:

                                WMLGlyphContainer() : BLParentGlyph(NULL) { }
};

class WMLLineElement : public BLGlyph
{
    public:

                                WMLLineElement(BLGlyph * parent) : BLGlyph(parent) {}
                                WMLLineElement() : BLGlyph(NULL) {}
```

```
        virtual Point       getExtent();
        virtual LineMetrics getMetrics() = 0;
        virtual void        setMetrics(const LineMetrics &/*metrics*/) {}

        virtual void        computeMetrics(int /*lineWidth*/) {}

        virtual bool        click(  const RectangleType & displayArea,
                                    const Point &offset,
                                    PointType p);
        virtual void        mouseSelect();

        virtual TextState   getTextState() { return mState; }

    protected:

                TextState   mState;

};

class WMLLine : public WMLLineElement
{
    public:

                            WMLLine(BLGlyph * parent, Alignment align);

                bool        drawOrClick(const RectangleType & displayArea,
                                        const Point &offset,
                                        PointType p,
                                        bool isDraw);

        virtual void        draw(const RectangleType & displayArea, const Point &offset);

        virtual LineMetrics getMetrics();

        virtual void        computeMetrics(int lineWidth) { mLineWidth = lineWidth; }

        virtual bool        click(  const RectangleType & displayArea,
                                    const Point &offset,
                                    PointType p);

                void *      operator new(size_t);

        virtual BLVector<BLGlyph*, kChildrenInc> * children()
                { return &mChildren; }

        static  BLVector<WMLLine *, kChildrenInc>  sUnusedLines;

    protected:

                BLVector<BLGlyph*, kChildrenInc>   mChildren;

        int             mLineWidth;
        Alignment       mAlign;

};

class WMLTextRun;

class ParagraphFlowVars
{
    public:

        ParagraphFlowVars() { mIterStack = NULL; mCurrentLine = NULL; }

        // incremental flow variables
        BLStack *   mIterStack;
        WMLLine *   mCurrentLine;
        TextState   mCurrentTextState;
        int         mWidthLeft;
        int         mDefaultWidth;
};
```

```
class WMLParagraph : public BLParentGlyph
{
    public:

                            WMLParagraph(BLGlyph * parent = NULL);
                            WMLParagraph(BLGlyph * parent, const WMLParagraph &original);

                bool        drawOrClick(const RectangleType & displayArea,
                                        const Point &offset,
                                        PointType p,
                                        bool isDraw);

        virtual void        draw(const RectangleType & displayArea, const Point &offset);
        virtual Point       getExtent();
        virtual Point       getExtent(const Point &areaExtent);

        virtual bool        flow(const Point &areaExtent);
        virtual bool        click(  const RectangleType & displayArea,
                                    const Point &offset,
                                    PointType p);

                void        needsReflow();

        friend  class       WBXMLParser;

    protected:

                void        flowText(WMLTextRun * textRun);
                void        newLine(bool doComputeMetrics = true);

                ParagraphFlowVars * mFlowVars;
                WMLGlyphContainer   mLines;
                Point               mTotalExtent;
                Alignment           mAlign;

                struct
                {
                    bool    mFlowDone : 1;
                    bool    mIsWrapOn : 1;
                    bool    mIsExtentCached : 1;
                    bool    mUnwrappedSpillOver : 1;
                } bits;
};

class WMLTextRun : public WMLLineElement
{
    public:

                            WMLTextRun( BLGlyph * parent,
                                        CharPtr text,
                                        int length,
                                        const TextState &state);

                            WMLTextRun(BLGlyph * parent, const WMLTextRun &run);

        virtual void        draw(const RectangleType & displayArea, const Point &offset);

        virtual LineMetrics getMetrics();

        static  int         getTextWidth(CharPtr text, int length, TextState &state, int
lineHeight);

                WMLTextRun *    getNextLine(BLGlyph * parent,
                                            int &pixelsAcross,
                                            int maxSize,
                                            int &cursor,
                                            bool skipLeadingSpace);

                bool            hasMoreText(int cursor) { return cursor < mLength; }
                TextState &     getState() { return mState; }
                void            setState(const TextState &state) { mState = state; }

                int         findLongestWord();
```

```
            void *      operator new(size_t);

        static  BLVector<WMLTextRun *, kChildrenInc>   sUnusedRuns;

    protected:

            int         backupToWhitespace(CharPtr text, int length);
            void        italicize(const RectangleType & displayArea);

            CharPtr     mText;
            int         mLength;
};

class WMLBreak : public BLGlyph
{
    public:

                        WMLBreak(BLGlyph * parent) : BLGlyph(parent) {}
};

cla== WMLImage : public WMLLineElement
{
    .lic:

                        WMLImage(const TextState &state);
                        WMLImage(BLGlyph * parent, const WMLImage &original);

        virtual void    draw(const RectangleType & displayArea, const Point &offset);
        virtual Point   getExtent();

        virtual void    computeMetrics(int lineWidth);
        virtual LineMetrics getMetrics() { return mMetrics; }

            bool        isDownloaded();
            CharPtr     getAltText() { return mAltText; }
            CharPtr     getSrc() { return mSrc; }

            void        setImageData(CharPtr data);

        friend  class   WBXMLParser;

    protected:

            LineMetrics mMetrics;
            CharPtr     mSrc;
            CharPtr     mAltText;
            Point       mSpace;
            Point       mTotalExtent;

            BitmapPtr   mData;
            Alignment   mAlign;

            WMLParagraph *  mParentParagraph;

            bool        mIsExtentCached;
};

// BLIterator.h

#include "BLVector.h"
#include "BLStack.h"

#pragma once

template <class T, int increment_>
class BLIterator
{
    public:

                        BLIterator(const BLVector<T, increment_> &vector);

        virtual bool    hasNext() const { return mCurrentPos < mVector.getNumElements(); }
        virtual T&      getNext() { return mElements[mCurrentPos++]; }
```

```
        virtual void    backup()  { mCurrentPos--; }
        virtual void    refresh() { mElements = mVector.getAllElements(); };
    private:

            T*          mElements;
            int         mCurrentPos;
        const   BLVector<T, increment_>&mVector;
};

template <class T, int increment_>
BLIterator<T, increment_>::BLIterator(const BLVector<T, increment_> &vector)
:   mVector(vector)
{
    mElements = vector.getAllElements();
    mCurrentPos = 0;
}


template <class T, int increment_>
class BLIteratorNode : public BLNode, public BLIterator<T, increment_>
{
    public:

        BLIteratorNode(const BLVector<T, increment_> &vector)
        :   BLIterator(vector) {}
};

// BLMemoryManager.cpp

#include "BLMemoryManager.h"
#include "BLIterator.h"
#include "BLVector.h"
#include "BLUtils.h"

#define USE_PALM_MEM

BLMemoryManager::BLMemoryManager()
:   mPool(kMemInitLen)
{
}


BLMemoryManager::~BLMemoryManager()
{
    flushAll();
    mPool.deleteAll();
}


void
BLMemoryManager::flushAll()
{
    BLIterator<MemoryBlock *, kMemInc> iter(mPool);

    while(iter.hasNext())
    {
        MemoryBlock * block = iter.getNext();

#ifdef USE_PALM_MEM
        MemPtrFree(block);
#else
        delete[](UChar*)block;
#endif
    }

    mPool.removeAll();
}


void *
BLMemoryManager::newChunk(size_t size)
{
    int numElems = mPool.getNumElements();
```

```
    MemoryBlock * block = NULL;

    // align on even boundary:
    if((size % 2) == 1)
        size++;

    if(numElems > 0)
    {
        block = mPool.getElementAt(numElems - 1);

        if(size > block->bytesFree())
        {
#ifdef USE_PALM_MEM
            size_t newChunkSize = max(block->physSize + kElemSize, block->logSize + size);

            Err err = MemPtrResize(block, newChunkSize + block->getOverhead());

            if(err)
            {
                // can't make it bigger, so shrink it to size of data
                MemPtrResize(block, block->logSize + block->getOverhead());
                block->physSize = block->logSize;

                block = NULL;
            }
            else
            {
                block->physSize = (UShort) newChunkSize;
            }
#else
            block = NULL;
#endif
        }
    }

    if(block == NULL)
    {
        size_t chunkSize = max(size, kElemSize);

#ifdef USE_PALM_MEM
        block = (MemoryBlock *) MemPtrNew(chunkSize + block->getOverhead());
    //  reportFreeMem();
#else
        block = (MemoryBlock *) new UChar[chunkSize + block->getOverhead()];
#endif

        if(block == NULL)
            throw OutOfMemoryException();

        block->physSize = (UShort) chunkSize;
        block->logSize = 0;

        mPool.add(block);
    }

    void * chunkStart = (UChar *)&block->memory + block->logSize;

    block->logSize += (UShort) size;

    return chunkStart;
}


void
BLMemoryManager::reportFreeMem()
{
    Char buf[100];
    ULong freeBytes, maxP;
    MemHeapFreeBytes(0, &freeBytes, &maxP);
    StrPrintF(buf, "Mem Free: %li, Biggest Chunk: %li", freeBytes, maxP);
    FrmCustomAlert(CustomAlert, buf, "", "");
}
// BLMemoryManager.h
```

```
#pragma once
#include "size_t.h"
#include "BLVectorHeader.h"

class MemoryBlock
{
    public:

        static  unsigned long   getOverhead() { return sizeof(MemoryBlock) - sizeof(UChar); }
                unsigned long   bytesFree() { return physSize - logSize; }

        UShort  logSize;
        UShort  physSize;
        UChar   memory;
};

class BLMemoryManager
{
    public:

        enum { kMemInitLen = 2, kMemInc = 2, kElemSize = 2048};

        BLMemoryManager();
        ~BLMemoryManager();

        void *  newChunk(unsigned long);
        void    flushAll();

        static  void        reportFreeMem();

    protected:

        BLVector<MemoryBlock *, kMemInc> mPool;
};// BLNetworking.cpp

#ifdef ENABLE_NETWORKING

#include "BLNetworking.h"
#include "BLUtils.h"
#include "BLForm.h"
#include "BLPrefs.h"
#undef memcpy
#include <sys_socket.h>

const DWord kMaxResultSize = 32*1024;
const int kBufferSize = 1024;
const int kMaxURLLength = 128;
const int kPageTimeout = 20;
const int kSendDelay = 2;

extern Word AppNetRefnum;
extern Long AppNetTimeout;

BLNetworking::BLNetworking()
{
    mReader = NULL;
    mBuffer = NULL;
    mRequestP = NULL;
    mTimerP = NULL;
    mGatewayIP = NULL;
    mContentLocation = NULL;
    mInetLibH = NULL;
    mInetSockH = NULL;

    mLastStatus = inetStatusPrvInvalid;

    mLibType = kNoLib;
    mIsNetLibWaitingForData = false;

    mTimeoutVal = kSendDelay * SysTicksPerSecond();
}


BLNetworking::~BLNetworking()
```

```
}
}


Err
BLNetworking::start()
{
    DWord value;

    mBytesUsed = 0;

    Err err = FtrGet(netFtrCreator, netFtrNumVersion, &value);

    if((!err) && (value != 0))
    {
        if((err = SysLibFind("Net.lib", &AppNetRefnum)) != 0)
            goto INET_OPEN;

        DWord   ifCreator=0;
        Word    ifInstance=0;

        if((err = NetLibIFGet(AppNetRefnum, 0, &ifCreator, &ifInstance)) != 0)
            goto INET_OPEN;

        Word ifErrs;
        err = NetLibOpen(AppNetRefnum, &ifErrs);

        if(err == netErrAlreadyOpen)
        {
            err = 0;
            ifErrs = 0;
        }

        if(!err && !ifErrs)
        {
            AppNetTimeout = kPageTimeout*SysTicksPerSecond();

            mTimeoutVal = kSendDelay * SysTicksPerSecond();

            mLibType = kNetLib;

            return 0;
        }
        else
        {
            NetLibClose(AppNetRefnum, false);
        }
    }

 INET_OPEN:

       r = FtrGet(inetLibFtrCreator, inetFtrNumVersion, &value);

    if((!err) && (value != 0))
    {
        Word config;

        if((err = SysLibFind("INet.lib", &mInetLibRefNum)) != 0)
            return err;

        if((err = INetLibConfigIndexFromName(  mInetLibRefNum,
                                               (INetConfigNamePtr) inetCfgNameCTPDefault,
                                               &config)) != 0)

            return err;

        if((err = INetLibOpen(  mInetLibRefNum,
                                config,
                                0,                  // DWord flags, currently unused
                                NULL,               // DmOpenRef cacheRef, don't use built-in
 cache
                                0,                  // DWord cacheSize, ignored
                                &mInetLibH))        // Handle* inetHP
                    != 0)
            return err;
```

```
        DWord conv = ctpConvNone;

        // turn off compression
        if((err = INetLibSettingSet(mInetLibRefNum,
                                    mInetLibH,
                                    inetSettingConvAlgorithm,
                                    &conv,
                                    sizeof(conv))) != 0)

            return err;

        DWord maxResultSize = kMaxResultSize;

        // set max size:
        if((err = INetLibSettingSet(mInetLibRefNum,
                                    mInetLibH,
                                    inetSettingMaxRspSize,
                                    &maxResultSize,
                                    sizeof(conv))) != 0)

            return err;

        mLibType = kINetLib;

        mBuffer = new Char[kBufferSize];

        mContentLocation = new Char[kMaxURLLength];

        return 0;   // INetLib found, return
    }

    ErrDisplay("Cannot open NetLib");

    return -1;
}


Err
BLNetworking::stop()
{
    Err err = 0;

    if(mLibType == kINetLib)
    {
        err = INetLibClose(mInetLibRefNum, mInetLibH);

        delete [] mBuffer;
        mBuffer = NULL;

        delete [] mContentLocation;
        mContentLocation = NULL;
    }
    else if(mLibType == kNetLib)
    {
        if(mRequestP)
        {
            delete mRequestP;
            mRequestP = NULL;
        }

        delete [] mGatewayIP;
        mGatewayIP = NULL;

        err = NetLibClose(AppNetRefnum, false);
    }

    return err;
}

void
BLNetworking::setTimer(ULong timeout, Timer * timerP)
{
    mTimerP = timerP;

    mTimeoutVal = (SDWord) min(timeout/2, mTimeoutVal);
}
```

```
void
BLNetworking::clearTimer()
{
    mTimerP = NULL;
    mTimeoutVal = kSendDelay * SysTicksPerSecond();
}


void
BLNetworking::getEvent(EventType & event)
{
    do {
        if(mLibType == kINetLib)
        {
            INetLibGetEvent(mInetLibRefNum,
                            mInetLibH,
                            (INetEventType*) &event,
                            mTimeoutVal);

            if(mTimerP && mTimerP->checkTime())
            {
                mTimeoutVal = kSendDelay * SysTicksPerSecond();
                mTimerP = NULL;
            }

            if(event.eType != nilEvent)
                return;
            else if(mLastStatus == inetStatusSendingRequest)
                displayStatus(inetStatusWaitingForResponse);

            continue;
        }
        else if(mIsNetLibWaitingForData)
        {
            fd_set  arfds, awfds, rfds, wfds;
            int nfds = 0;

            if(mRequestP == NULL)
            {
                mIsNetLibWaitingForData = false;
                continue;
            }

            int sock = mRequestP->getSock();

            FD_ZERO(&arfds);
            FD_ZERO(&awfds);
            FD_SET(sock, &arfds);
            FD_SET(STDIN_FILENO,  &arfds);
            nfds = sock+1;

            while(true)
            {
                bcopy(&arfds, &rfds, sizeof(rfds));
                bcopy(&awfds, &wfds, sizeof(wfds));

                if(select(nfds, &rfds, &wfds, (fd_set*)0, (struct timeval *) 0) < 0)
                {
                    EvtGetEvent(&event, 1);
                    return;
                }

                bool nothingSet = true;

                if(FD_ISSET(sock, &rfds))
                {
                    nothingSet = false;

                    if(!mParsedHeader)
                    {
                        if(mRequestP->parseHTTPHeader())
                            mParsedHeader = true;
                        else
```

```
                        {
                            mReader->readFailure();
                            mIsNetLibWaitingForData = false;
                            delete mRequestP;
                            mRequestP = NULL;
                            break;
                        }
                    }

                    mLastStatus = inetStatusPrvInvalid;

                    if(mReader->readData(NULL, 0) == 0)
                    {
                        mIsNetLibWaitingForData = false;
                        break;
                    }
                }
                if(FD_ISSET(STDIN_FILENO, &rfds))
                {
                    nothingSet = false;

                    EvtGetEvent(&event, 1);
                    return;
                }

                if(nothingSet)
                    break;
            }
        }

        EvtGetEvent(&event, mTimeoutVal);

        if(mTimerP && mTimerP->checkTime())
        {
            mTimeoutVal = kSendDelay * SysTicksPerSecond();
            mTimerP = NULL;
        }

        if(event.eType != nilEvent)
            return;

    } while(true);
}


void
BLNetworking::dataReady(Handle sockH, Word status)
{
    // !!! someday, enable multiple sockets (up to 4 on with NetLib)

    if(mLibType == kINetLib)
    {
        ULong numAvail;

        displayStatus(status);

        Err err = INetLibSockRead( mInetLibRefNum,
                                   sockH,
                                   mBuffer + mBytesUsed,
                                   kBufferSize - mBytesUsed,
                                   &numAvail,
                                   kPageTimeout * SysTicksPerSecond());

        if(!err && (numAvail > 0))
        {
            if(mReader)
            {
                ULong bytesRead = mReader->readData(mBuffer, numAvail + mBytesUsed);
                ULong bytesLeft = mBytesUsed + numAvail - bytesRead;

                if(bytesLeft > 0)
                {
                    MemMove(mBuffer, mBuffer + bytesRead, bytesLeft);
                    mBytesUsed = (UInt) bytesRead;
                }
```

```
            else
            {
                mBytesUsed = 0;
            }
        }
    }
    else
    {
        mReader->readData(NULL, 0);

        INetLibSockClose(mInetLibRefNum, sockH);

        if(mInetSockH == sockH)
            mInetSockH = NULL;
    }
  }
}


int
BLNetworking::peek(CharPtr buffer, int length)
{
    turn recv(getSock(), buffer, (Word) length, netIOFlagPeek);
}


int
BLNetworking::readData(CharPtr buffer, int length)
{
    return NetLibReceive(AppNetRefnum, getSock(), buffer, (Word) length, 0,0,0,0,&errno);
}


CharPtr
BLNetworking::openURL(CharPtr url, bool updateStatus)
{
    Err err = 0;

    CharPtr gatewayP = BLPrefs::sPrefs.mServerAddress;

    if(mLibType == kINetLib)
    {
        CharPtr fullURL = new Char[StrLen("http://") + StrLen(gatewayP) + StrLen(url) + 1];

        if(fullURL == NULL)
            return "Out of memory.";    // !!! Do something smart here.

        StrCopy(fullURL, gatewayP);
        StrCopy(fullURL + StrLen(fullURL), url);

        // !!! delete url if error

        if((err = INetLibSockOpen( mInetLibRefNum,
                                   mInetLibH,
                                   inetSchemeHTTP,
                                   &mInetSockH)) != 0)
            return "Could not open Internet socket";

        if((err = INetLibSockConnect(  mInetLibRefNum,
                                       mInetSockH,
                                       (BytePtr) gatewayP,
                                       kHTTPPort,
                                       -1)) != 0)
            return "Could not connect to Gateway";

        if((err = INetLibSockHTTPReqCreate(    mInetLibRefNum,
                                           mInetSockH,
                                           (BytePtr) "GET",
                                           (BytePtr) fullURL,
                                           NULL)) != 0)
            return "Could not get URL";

        if((err = INetLibSockHTTPReqSend(  mInetLibRefNum,
                                           mInetSockH, NULL, 0,
                                           -1)) != 0)
```

```
            return "Could not send HTTP request";
        delete [] fullURL;

        //  alternative:
        //  Err err = INetLibURLOpen(mInetLibRefNum, mInetLibH, (BytePtr)url, NULL,
&mInetSockH,
        //                  kPageTimeout * SysTicksPerSecond(), 0);
    }
    else if(mLibType == kNetLib)
    {
        if(mRequestP && (mRequestP->requestFile(url) > 0))
        {
            if(updateStatus)
                displayStatus(inetStatusWaitingForResponse);

            mIsNetLibWaitingForData = true;
            mParsedHeader = false;

            return NULL;
        }

        if(mRequestP)
        {
            delete mRequestP;
            mRequestP = NULL;
        }

        if(updateStatus)
            displayStatus(inetStatusConnecting);

        if(mGatewayIP == NULL)
        {
            struct hostent  *hp;

            if((hp = gethostbyname(gatewayP)) == NULL)
            {
                Byte allInterfacesUp;
                Word inetErr;

                Err err = NetLibConnectionRefresh(AppNetRefnum, true, &allInterfacesUp,
&inetErr);

                if(!err && !inetErr)
                {
                    if((hp = gethostbyname(gatewayP)) == NULL)
                    {
                        mIsNetLibWaitingForData = false;
                        return "Cannot send request";
                    }
                }
                else
                {
                    mIsNetLibWaitingForData = false;
                    return "Cannot send request";
                }
            }

            mGatewayIP = BLUtils::IPToString(*(ULong*) hp->h_addr_list[0]);
        }

        int sock = NetUTCPOpen(mGatewayIP, NULL, kHTTPPort);

        if(sock < 0)
        {
            Byte allInterfacesUp;
            Word inetErr;

            Err err = NetLibConnectionRefresh(AppNetRefnum, true, &allInterfacesUp,
&inetErr);

            if(!err && !inetErr)
            {
                sock = NetUTCPOpen(mGatewayIP, NULL, kHTTPPort);
            }
```

```
    }

    if(sock >= 0)
    {
        mRequestP = new HTTPRequest(sock, gatewayP);
        if(mRequestP->requestFile(url) > 0)
        {
            if(updateStatus)
                displayStatus(inetStatusWaitingForResponse);

            mIsNetLibWaitingForData = true;
            mParsedHeader = false;
            return NULL;
        }
        else return "Cannot send request";
    }
    else
    {
        mIsNetLibWaitingForData = false;
        return "Cannot open socket";
    }
  }

    urn NULL;
}


void
BLNetworking::cancelOpenURL()
{
    if(mLibType == kINetLib)
    {
        if(mInetSockH != NULL)
        {
            INetLibSockClose(mInetLibRefNum, mInetSockH);
            mInetSockH = NULL;
        }
    }
    else
    {
        mIsNetLibWaitingForData = false;
        delete mRequestP;
        mRequestP = NULL;
    }
}


void
BLNetworking::displayStatus(Word status)
{
    '((status != mLastStatus) && (status != inetStatusPrvInvalid))

        CharPtr message = NULL;

        switch(status)
        {
            case inetStatusNew: // just opened
            case inetStatusResolvingName: // looking up host address
            case inetStatusNameResolved: // found host address
            case inetStatusConnecting: // connecting to host
            case inetStatusConnected: // connected to host
                message = "Connecting...";
                break;

            case inetStatusSendingRequest: // sending request
                message = "Sending...";
                break;

            case inetStatusWaitingForResponse: // waiting for response
                message = "Waiting...";
                break;

            case inetStatusReceivingResponse: // receiving response
            case inetStatusResponseReceived: // response received
            case inetStatusClosingConnection: // closing connection
```

```
            case inetStatusClosed: // closed
                break;
        }

        if(message != NULL)
            BLForm::setTitle(message);

        mLastStatus = status;
    }
}


BLNetworking::ContentType
BLNetworking::getContentType()
{
    if(mLibType == kINetLib)
    {
    /*  Word setting = inetSockSettingContentTypeID;

        Byte buffer[16];

        INetLibSockSettingGet(mInetLibRefNum, mInetSockH, setting, buffer, sizeof(buffer));
(INetContentTypeEnum)*/

        return kWMLC;
    }

    if(mRequestP)
    {
        CharPtr contentType = mRequestP->getContentType();

        if(contentType == NULL)
            return kUnknown;

        else if(StrCaselessCompare(contentType, "text/vnd.wap.wmlc") == 0)
            return kWMLC;

        else if(StrCaselessCompare(contentType, "image/vnd.palm.pbmp") == 0)
            return kPalmBitmap;
    }

    return kUnknown;
}


int
BLNetworking::getContentLength()
{
    if(mRequestP)
    {
        if(mRequestP->getEncodingType() == HTTPRequest::kRaw)
            return mRequestP->getContentLength();
        else
            return -1;
    }
    else return -1;
}


CharPtr
BLNetworking::getContentLocation()
{
    if(mLibType == kINetLib)
    {
        if(mInetSockH != NULL)
        {
            Word setting = inetSockSettingURL;
            Word length = kMaxURLLength;

            INetLibSockSettingGet(mInetLibRefNum, mInetSockH, setting, mContentLocation,
&length);

            if(length > 0)
                return mContentLocation;
            else
```

```
                return NULL;
            }
            else return NULL;
        }

        if(mRequestP)
            return mRequestP->getContentLocation();
        else return NULL;
}


#endif// BLNetworking.h

#pragma once

#include "BLTypes.h"

#include "HTTPRequest.h"

class BLNetworking
{
    public:

                enum NetLibType { kNoLib, kNetLib, kINetLib };
                enum ContentType { kUnknown, kWMLC, kPalmBitmap };

                        BLNetworking();
                        ~BLNetworking();

                Err         start();
                Err         stop();

                void        getEvent(EventType & event);

                void        dataReady(Handle sockH, Word status = inetStatusPrvInvalid);

                int         peek(CharPtr buffer, int length);
                int         readData(CharPtr buffer, int length);

                void        registerReader(DataReader * reader)
                            {   mReader = reader;   }

                CharPtr     openURL(CharPtr url, bool updateStatus = true);

                void        cancelOpenURL();

                void        displayStatus(Word status);

                NetLibType  getNetLibType() { return mLibType; }

                int         getSock() { if(mRequestP) return mRequestP->getSock();
                                        else return -1;}

                ContentType getContentType();

                int     getContentLength();

                HTTPRequest::EncodingType getEncodingType() {  if(mRequestP) return
mRequestP->getEncodingType();
                                                               else return
HTTPRequest::kUnknown;}

                CharPtr getContentLocation();

                void        setTimer(ULong timeout, Timer * timerP);
                void        clearTimer();

        protected:

            DataReader *    mReader;

            char *      mBuffer;
            UInt        mBytesUsed;
```

```
            UInt        mInetLibRefNum;
            Handle      mInetLibH;
            Handle      mInetSockH;

            Word        mLastStatus;
            bool        mIsSending;

            HTTPRequest * mRequestP;

            NetLibType  mLibType;
            bool        mIsNetLibWaitingForData;
            bool        mParsedHeader;

            Timer *     mTimerP;
            SDWord      mTimeoutVal;

            CharPtr     mGatewayIP;
            CharPtr     mContentLocation;
};// BLPagesDB.cpp

#include "BLPagesDB.h"
#include "BrowserApp.h"

void
BLPagesDB::open()
{
    BLDatabase::open(BrowserApp::appFileCreator, 'docs', "BLDocs", dmModeReadOnly);

    mOpenPage = NULL;
}


void
BLPagesDB::close()
{
    if(mOpenPage != NULL)
    {
        MemHandleUnlock(mOpenPage);
        DmReleaseRecord(mRef, mOpenPageNum, false);
        mOpenPage = NULL;
    }

    BLDatabase::close();
}


RawPageData *
BLPagesDB::get(CharPtr url)
{
    UShort i=0;

    if(mOpenPage != NULL)
    {
        MemHandleUnlock(mOpenPage);
        DmReleaseRecord(mRef, mOpenPageNum, false);
        mOpenPage = NULL;
    }

    UShort numRecords = DmNumRecords(mRef);

    while(i < numRecords)
    {
        BLPageHand pageHand = (BLPageHand) DmGetRecord(mRef, i++);

        if(pageHand == NULL)
            continue;

        BLPagePtr pageP = (BLPagePtr) MemHandleLock(pageHand);

        if(StrCompare(url, &pageP->data) == 0)
        {
            mOpenPage = pageHand;
            mOpenPageNum = i-1;

            return getPageData(pageHand, pageP);
```

```
    }

    MemHandleUnlock(pageHand);
    DmReleaseRecord(mRef, i-1, false);
  }

  // no page found in cache

  return NULL;

  BLPageHand pageHand = (BLPageHand) DmGet1Resource('tSTR', 1000);

  RawPageData * pageData = new RawPageData(false, false, false, pageHand);

  pageData->mData = (CharPtr) MemHandleLock(pageHand);
  pageData->mLength = (UInt) MemHandleSize(pageHand);

  // Don't include NULL terminator in length
  if(pageData->mLength > 0)
      pageData->mLength--;

  return pageData;
}


RawPageData *
BLPagesDB::getPageData(BLPageHand pageHand, BLPagePtr pageP)
{
   RawPageData * pageData = new RawPageData(false, false, false, pageHand);

   UInt offset = StrLen(&pageP->data) + 1;

   pageData->mData = &pageP->data + offset;
   pageData->mLength = (UInt)MemPtrSize(pageP) - offset - (UInt)sizeof(ULong);

   if(((ULong)pageData->mData % 2) != 0)
   {
       pageData->mData++;
       pageData->mLength--;
   }

   return pageData;

}


// BLPagesDB.h

#pragma once

#i     e "BLDatabase.h"
#i.   ,e "BLTypes.h"

struct BLPage
{
    ULong   reserved;
    Char    data;
};

typedef BLPage * BLPagePtr;
typedef BLPagePtr * BLPageHand;

class BLPagesDB : public BLDatabase
{
    public:

        virtual void    open();
        virtual void    close();

            RawPageData * get(CharPtr url);

    protected:

            RawPageData * getPageData(BLPageHand pageHand, BLPagePtr pageP);
```

```
                BLPageHand  mOpenPage;
                UInt        mOpenPageNum;
};// BLPrefs.cpp

#include "BLPrefs.h"
#include "BrowserApp.h"

PrefsType
BLPrefs::sPrefs;

void
BLPrefs::read()
{
    Word prefsSize;

    // Read the saved preferences / saved-state information.
    prefsSize = sizeof(sPrefs);
    if(PrefGetAppPreferences(BrowserApp::appFileCreator, 0, &sPrefs, &prefsSize, true) !=
        noPreferenceFound)
    {
    }
    else
    {
        // set default prefs:
        StrCopy(sPrefs.mServerAddress, kHTTPGateway);
        sPrefs.mShowImages = true;
    }
}


void
BLPrefs::write()
{
    // Write the saved preferences / saved-state information.  This data
    // will be backed up during a HotSync.
    PrefSetAppPreferences( BrowserApp::appFileCreator, 0,
                           BrowserApp::kPrefsVersion,
                           &sPrefs, sizeof(sPrefs), true);

}// BLPrefs.h

#pragma once

class PrefsType
{
    public:

        bool    mShowImages;
        Char    mServerAddress[64];
};


class BLPrefs
{
    public:

        static  void        read();
        static  void        write();

        static  PrefsType   sPrefs;
};// BLStack.h

#pragma once

class BLNode
{
    public:
                BLNode *    mNext;
};

class BLStack
{
    public:
                            BLStack()   { mTop = NULL; }
        virtual             ~BLStack()  {}
```

```
        void        push(BLNode * item)
                    {
                        item->mNext = mTop;
                        mTop = item;
                    }

        BLNode  *   pop()
                    {
                        BLNode * poppedNode = mTop;

                        if(mTop != NULL)
                        {
                            mTop = mTop->mNext;
                            poppedNode->mNext = NULL;
                        }

                        return  poppedNode;
                    }

        BLNode  *   top() const { return mTop; }

    protected:

        BLNode  *       mTop;

};#include "BLTextTags.h"

BLTextTags::BLTextTags(BLGlyph * parent, XMLElement * elem)
:   BLGlyph(parent, false)
{
}


BLTextTags::~BLTextTags()
{
}


bool
BLTextTags::draw(const RectangleType & displayArea, const Point offset)
{
    return BLGlyph::draw(displayArea, offset);
}

Point
BLTextTags::getExtent(const RectangleType & displayArea, const Point offset)
{
    return BLGlyph::getExtent(displayArea, offset);
}


b
BL....cTags::registerIfTextTag(BLGlyph * glyphP, XMLElement * child)
{
    bool handled = false;

    if (StrCompare(child->mName, "em") == 0)
    {
        WMLEmphasis * emphasis = new WMLEmphasis(glyphP, child);
        emphasis->layoutNode(child);
        handled = true;
    }
    else if (StrCompare(child->mName, "strong") == 0)
    {
        WMLStrong * strong = new WMLStrong(glyphP, child);
        strong->layoutNode(child);
        handled = true;
    }
    else if (StrCompare(child->mName, "i") == 0)
    {
        WMLUnderLine * underline = new WMLUnderLine(glyphP, child);
        underline->layoutNode(child);
        handled = true;
    }
    else if (StrCompare(child->mName, "u") == 0)
```

```
    {
        WMLUnderLine * underline = new WMLUnderLine(glyphP, child);
        underline->layoutNode(child);
        handled = true;
    }
    else if (StrCompare(child->mName, "big") == 0)
    {
        WMLBig * big = new WMLBig(glyphP, child);
        big->layoutNode(child);
        handled = true;
    }
    else if(StrCompare(child->mName, "small") == 0)
    {
        handled = false;
    }
    return handled;
}


#pragma mark ----------------

WMLUnderLine::WMLUnderLine(BLGlyph * parent, XMLElement * elem)
:   BLTextTags(parent, elem)
{
}


WMLUnderLine::~WMLUnderLine()
{
}


bool
WMLUnderLine::draw(const RectangleType & displayArea, const Point offset)
{
    bool result;

    WinSetUnderlineMode(solidUnderline);
    result = BLGlyph::draw(displayArea, offset);
    WinSetUnderlineMode(noUnderline);

    return result;
}


Point
WMLUnderLine::getExtent(const RectangleType & displayArea, const Point offset)
{
    Point pt;

    WinSetUnderlineMode(solidUnderline);
    pt = BLGlyph::getExtent(displayArea, offset);
    WinSetUnderlineMode(noUnderline);

    return pt;
}

#pragma mark ----------------

WMLEmphasis::WMLEmphasis(BLGlyph * parent, XMLElement * elem)
:   BLTextTags(parent, elem)
{
}


WMLEmphasis::~WMLEmphasis()
{
}


bool
WMLEmphasis::draw(const RectangleType & displayArea, const Point offset)
{
    FontID curFont;
```

```
    bool result;

    curFont = FntSetFont (boldFont);
    result = BLGlyph::draw(displayArea, offset);
    FntSetFont (curFont);

    return result;
}


Point
WMLEmphasis::getExtent(const RectangleType & displayArea, const Point offset)
{
    FontID curFont;
    Point pt;

    curFont = FntSetFont (boldFont);
    pt = BLGlyph::getExtent(displayArea, offset);
    FntSetFont (curFont);

    return pt;
}


#p      mark ----------------

WMLStrong::WMLStrong(BLGlyph * parent, XMLElement * elem)
:   BLTextTags(parent, elem)
{
}


WMLStrong::~WMLStrong()
{
}


bool
WMLStrong::draw(const RectangleType & displayArea, const Point offset)
{
    FontID curFont;
    bool result;

    curFont = FntSetFont (largeBoldFont);
    result = BLGlyph::draw(displayArea, offset);
    FntSetFont (curFont);

    return result;
}


P(
WM.    ong::getExtent(const RectangleType & displayArea, const Point offset)
{
    FontID curFont;
    Point pt;

    curFont = FntSetFont (largeBoldFont);
    pt = BLGlyph::getExtent(displayArea, offset);
    FntSetFont (curFont);

    return pt;
}


#pragma mark ----------------

WMLBig::WMLBig(BLGlyph * parent, XMLElement * elem)
:   BLTextTags(parent, elem)
{
}


WMLBig::~WMLBig()
{
```

```
}

bool
WMLBig::draw(const RectangleType & displayArea, const Point offset)
{
    FontID curFont;
    bool result;

    curFont = FntSetFont (largeFont);
    result = BLGlyph::draw(displayArea, offset);
    FntSetFont (curFont);

    return result;
}


Point
WMLBig::getExtent(const RectangleType & displayArea, const Point offset)
{
    FontID curFont;
    Point pt;

    curFont = FntSetFont (largeFont);
    pt = BLGlyph::getExtent(displayArea, offset);
    FntSetFont (curFont);

    return pt;
}
// BLTextTags.h

#pragma once

#include "BLGlyph.h"

class BLTextTags : public BLGlyph
{
    public:

                                BLTextTags(BLGlyph * parent, XMLElement * elem);
        virtual                 ~BLTextTags();

        virtual bool            draw(const RectangleType & displayArea, const Point offset);
        virtual Point           getExtent(const RectangleType & displayArea, const Point offset);

        static  bool            registerIfTextTag(BLGlyph * glyphP, XMLElement * child);

    protected:

};


class WMLUnderLine : public BLTextTags
{
    public:

                                WMLUnderLine(BLGlyph * parent, XMLElement * elem);
        virtual                 ~WMLUnderLine();

        virtual bool            draw(const RectangleType & displayArea, const Point offset);
        virtual Point           getExtent(const RectangleType & displayArea, const Point offset);

    protected:
};


class WMLEmphasis : public BLTextTags
{
    public:

                                WMLEmphasis(BLGlyph * parent, XMLElement * elem);
        virtual                 ~WMLEmphasis();

        virtual bool            draw(const RectangleType & displayArea, const Point offset);
        virtual Point           getExtent(const RectangleType & displayArea, const Point offset);
```

```
    protected:
};

class WMLStrong : public BLTextTags
{
    public:
                            WMLStrong(BLGlyph * parent, XMLElement * elem);
        virtual             ~WMLStrong();

        virtual bool        draw(const RectangleType & displayArea, const Point offset);
        virtual Point       getExtent(const RectangleType & displayArea, const Point offset);

    protected:
};

class WMLBig : public BLTextTags
{
    public:
                            WMLBig(BLGlyph * parent, XMLElement * elem);
        virtual             ~WMLBig();

        virtual bool        draw(const RectangleType & displayArea, const Point offset);
        virtual Point       getExtent(const RectangleType & displayArea, const Point offset);

    protected:
};// BLTypes.h

#pragma once

class Point
{
    public:

                    Point() { x = 0; y = 0;}
                    Point(const PointType &pt) { x = pt.x; y = pt.y; }
                    Point(SWord x_, SWord y_) { x = x_; y = y_; }
                    Point(const Point &p)   { x = p.x; y = p.y; }

        PointType   palmPoint() const
                    {
                        PointType p; p.x = x; p.y = y; return p;
                    }

        Boolean     isInside(const RectangleType &rect)
                    {
                        return RctPtInRectangle(x, y, (RectangleType *const) &rect);
                    }

        bool        operator==(const Point &p) const { return (x == p.x) && (y == p.y); }
        bool        operator!=(const Point &p) const { return !operator==(p); }

        Point       operator-(const Point &p) {Point n;
                                               n.x = x-p.x;
                                               n.y = y-p.y;
                                               return n; }

                    operator PointType() const { return palmPoint(); }

        void        offset(Point p)
                    {
                        x += p.x;
                        y += p.y;
                    }

    static Point minPoint(const Point &p1, const Point &p2)
                    {
                        Point min;
                        min.x = min(p1.x, p2.x);
                        min.y = min(p1.y, p2.y);
                        return min;
                    }
```

```
        SWord x;
        SWord y;

        static Point sZeroPoint() { Point p(0, 0); return p; }
};

class RectUtils
{
    public:

        static void shrink(RectangleType &rect, Point p)
        {
            rect.extent.x -= p.x;
            rect.extent.y -= p.y;
        }

        static bool isZero(const RectangleType &rect)
        {
            return  (rect.extent.x == 0) || (rect.extent.y == 0);
        }

        static RectangleType zeroRect()
        {
            RectangleType rect;

            rect.topLeft.x = rect.topLeft.y = rect.extent.x = rect.extent.y = 0;

            return rect;
        }
};


class RawPageData
{
    public:

        RawPageData(bool unlock, bool deallocate, bool release, VoidHand handle)
        {
            mUnlock = unlock;
            mDeallocate = deallocate;
            mRelease = release;

            mHandle = handle;

            mData = NULL;
            mLength = 0;
            mHandle = NULL;
        }

        ~RawPageData()
        {
            if(mUnlock) { MemHandleUnlock(mHandle);  }
            if(mRelease) { DmReleaseResource(mHandle); }
            if(mDeallocate) delete[] mData;
        }

        bool isData()
        {
            return (mData != NULL) && (mLength > 0);
        }

        char *      mData;
        UInt        mLength;
        VoidHand    mHandle;

    protected:

        bool    mUnlock;
        bool    mDeallocate;
        bool    mRelease;
};


class DataReader
{
```

```
   public:

      virtual ULong    readData(CharPtr buffer, ULong length) = 0;

      virtual void     readFailure() {}
};

class Timer
{
   public:

      virtual bool     checkTime() = 0;
};
// BLURLHandler.h

#pragma once

class BLURLHandler
{
   public:

      virtual void     goTo(char * url, bool relativeURL) = 0;
      virtual void     mailTo(char * url) = 0;
};// BLUtils.cpp

 .ude "BLUtils.h"
#include "BLVector.h"
#include "BLIterator.h"

CharPtr
BLUtils::cloneString(CharPtr str, UInt extraSpace)
{
   if(str == NULL)
      return NULL;

   CharPtr copy = new Char[StrLen(str) + 1 + extraSpace];

   if(copy != NULL)
      return StrCopy(copy, str);
   else
      throw OutOfMemoryException();

   return NULL;
}


bool
BLUtils::copyStringIfRoom(CharPtr dest, CharPtr source, int destSize)
{
   if(StrLen(source) > destSize)
      return false;

    trCopy(dest, source);

   return true;
}


VoidPtr
BLUtils::getObjectPtr(Word objectID)
{
   FormPtr frmP;

   frmP = FrmGetActiveForm();
   return FrmGetObjectPtr(frmP, FrmGetObjectIndex(frmP, objectID));
}


bool
BLUtils::isWhitespace(CharPtr text, int length)
{
   for(int i=0; i<length; i++)
   {
      if(!isWhitespace(text[i]))
         return false;
```

```
   }
   return true;
}


bool
BLUtils::isWhitespace(Char c)
{
   return (c == ' ') || (c == '\n') || (c == '\r');
}


bool
BLUtils::isDigit(Char c)
{
   return (c >= '0') && (c <= '9');
}


bool
BLUtils::isHexDigit(Char c)
{
   return  ((c >= 'a') && (c <= 'f')) ||
           ((c >= 'A') && (c <= 'F')) ||
           isDigit(c);
}


int
BLUtils::getNumericalValue(Char c)
{
   if(isDigit(c))
      return c - '0';
   else if((c >= 'a') && (c <= 'f'))
      return 10 + c - 'a';
   else if((c >= 'A') && (c <= 'A'))
      return 10 + c - 'a';
   else
      return -1;
}


int
BLUtils::hexToInt(CharPtr hexString, int &bytesUsed, int bytesAvailable)
{
   int result = 0;
   int pos = 0;

   while(isHexDigit(hexString[pos]))
   {
      int value = getNumericalValue(hexString[pos]);

      result <<= 4;
      result |= value;

      pos++;

      if(pos == bytesAvailable)
         return -1;
   }

   bytesUsed += pos;

   return result;
}


/*********************************************************************
 *
 * FUNCTION:     getFocusObjectPtr
 *
 * DESCRIPTION: This routine returns a pointer to the field object, in
 *              the current form, that has the focus.
 *
```

```
 * PARAMETERS:  nothing
 *
 * RETURNED:    pointer to a field object or NULL of there is no focus
 *
 ***********************************************************************/
FieldPtr
BLUtils::getFocusObjectPtr(void)
{
    FormPtr frmP;
    Word focus;

    // Get a pointer to tha active form and the index of the form object with focus.
    frmP = FrmGetActiveForm();
    focus = FrmGetFocus(frmP);

    // If no object has the focus return NULL pointer.
    if (focus == noFocus)
        return (NULL);

    // Return a pointer to the object with focus.
    return ((FieldPtr)FrmGetObjectPtr(frmP, focus));
}


/    ***********************************************************************
 *
 * FUNCTION:    setFieldToStrResource
 *
 * DESCRIPTION:
 *
 * PARAMETERS:  fieldID
 *
 *
 * RETURNED:
 *
 ***********************************************************************/
void
BLUtils::setFieldToStrResource(Word fieldID, Word strResID)
{
    CharPtr defaultProtocolStr;
    VoidHand rscHandle;

    rscHandle = DmGet1Resource('tSTR', (Int) strResID);
    defaultProtocolStr = (CharPtr) MemHandleLock(rscHandle);
    BLUtils::writeStrToField(fieldID, defaultProtocolStr);
    MemHandleUnlock(rscHandle);
    DmReleaseResource(rscHandle);
}


     ***********************************************************************

 * rUNCTION:    writeStrToField
 *
 * DESCRIPTION: This routine allocates a handle and sets the field to the str
 *
 * PARAMETERS:  fieldID
 *              str -- string to write to the field
 *
 * RETURNED:
 *
 ***********************************************************************/
void
BLUtils::writeStrToField(Word fieldID, CharPtr str)
{
    Handle  newHandle;

    // Allocate a new memory chunk that will contain a copy of the str.
    newHandle = (Handle)MemHandleNew(StrLen(str) + 1);

    // Copy the str to the locked handle.
    StrCopy((CharPtr)MemHandleLock(newHandle), str);

    // Unlock the new memory chunk.
    MemHandleUnlock(newHandle);
```

```
    // Set the field's text to the data in the new memory chunk.
    setFieldTextFromHandle(fieldID, newHandle);
}


/***********************************************************************
 *
 * FUNCTION:    setFieldTextFromHandle
 *
 * DESCRIPTION: This routine sets the text handle given field id,
 *
 * PARAMETERS:  fieldID
 *              txtH -- handle of the string
 *
 * RETURNED:
 *
 ***********************************************************************/
FieldPtr
BLUtils::setFieldTextFromHandle(Word fieldID, Handle txtH)
{
    Handle      oldTxtH;
    FormPtr     frmP = FrmGetActiveForm();
    FieldPtr    fldP;


    // get the field and the field's current text handle.
    fldP     = (FieldPtr) FrmGetObjectPtr(frmP, FrmGetObjectIndex(frmP, fieldID));
    ErrNonFatalDisplayIf(!fldP, "missing field");
    oldTxtH  = FldGetTextHandle(fldP);

    // set the field's text to the new text.
    FldSetTextHandle(fldP, txtH);
    //FldDrawField(fldP);

    // free the handle AFTER we call FldSetTextHandle().
    if (oldTxtH)
        MemHandleFree(oldTxtH);

    return fldP;
}


void
BLUtils::initBasicDialogForm(FormPtr& frmP, Word frmID, FormEventHandlerPtr handlerP, Word
focusFieldID)
{
    MenuEraseStatus(0);
    frmP = FrmInitForm(frmID);

    // Place cusror in field if not NULL
    if (focusFieldID)
        FrmSetFocus(frmP, FrmGetObjectIndex(frmP, focusFieldID));

    FrmSetActiveForm(frmP);

    if(handlerP)
        FrmSetEventHandler(frmP, handlerP);
}


bool
BLUtils::isInsideRectVector(Point p, BLVector<RectangleType, 4> & vector)
{
    BLIterator<RectangleType, 4> iter(vector);

    while(iter.hasNext())
    {
        RectangleType rect = iter.getNext();

        if(p.isInside(rect))
            return true;
    }

    return false;
```

```
}


CharPtr
BLUtils::IPToString(ULong ipAddress)
{
    CharPtr string = new Char[4*4];
    int pos = 0;

    for(int i=0; i<4; i++)
    {
        StrIToA(string + pos, (Long) ((ipAddress & 0xFF000000) >> 24));
        pos = (int) StrLen(string);
        string[pos++] = '.';

        ipAddress <<= 8;
    }

    string[pos - 1] = '\0';

    return string;
}


/* a bit is 1 if the corresponding char needs to be escaped */

#define BIT_PACK(b0, b1, b2, b3, b4, b5, b6, b7)(b7 << 7) | \
                                                (b6 << 6) | \
                                                (b5 << 5) | \
                                                (b4 << 4) | \
                                                (b3 << 3) | \
                                                (b2 << 2) | \
                                                (b1 << 1) | \
                                                (b0 << 0)


const Byte kEscapeSymbol[0x80 / 8] =
{
/* 0x0 */   BIT_PACK(1, 1, 1, 1, 1, 1, 1, 1),
/* 0x8 */   BIT_PACK(1, 1, 1, 1, 1, 1, 1, 1),
/* 0x10 */  BIT_PACK(1, 1, 1, 1, 1, 1, 1, 1),
/* 0x18 */  BIT_PACK(1, 1, 1, 1, 1, 1, 1, 1),
/* 0x20 */  BIT_PACK(1, 0, 1, 0, 0, 1, 0, 0),
/* 0x28 */  BIT_PACK(0, 0, 0, 0, 0, 0, 0, 0),
/* 0x30 */  BIT_PACK(0, 0, 0, 0, 0, 0, 0, 0),
/* 0x38 */  BIT_PACK(0, 0, 0, 0, 1; 0, 1, 0),
/* 0x40 */  BIT_PACK(0, 0, 0, 0, 0, 0, 0, 0),
/* 0x48 */  BIT_PACK(0, 0, 0, 0, 0, 0, 0, 0),
/* 0x50 */  BIT_PACK(0, 0, 0, 0, 0, 0, 0, 0),
/  `x58 */  BIT_PACK(0, 0, 0, 1, 1, 1, 1, 0),
     60 */  BIT_PACK(0, 0, 0, 0, 0, 0, 0, 0),
,   x68 */  BIT_PACK(0, 0, 0, 0, 0, 0, 0, 0),
/* 0x70 */  BIT_PACK(0, 0, 0, 0, 0, 0, 0, 0),
/* 0x78 */  BIT_PACK(0, 0, 0, 1, 1, 1, 0, 1)
};


inline static bool
checkBit(int num)
{
    return (kEscapeSymbol[num / 8] & (1 << (num % 8))) != 0;
}


bool
BLUtils::escapeChars(CharPtr dest, CharPtr source, UInt destSize)
{
    // !!! Do rest of www.ietf.org/rfc/rfc2396.txt

    int sourcePos = 0;
    int destPos = 0;

    if(StrNCompare(source, "http://", StrLen("http://")) == 0)
    {
        StrCopy(dest, "http://");
```

```
        sourcePos = destPos = (int) StrLen("http://");
    }

    while(1)
    {
        if((destPos + 1) >= destSize)
            return false;

        bool escape = false;

        Byte c = (Byte) source[sourcePos];

        if(c == 0)
            break;
        else if(c > 0x80)
            escape = true;
        else
            escape = checkBit(c);

        if(escape)
        {
            Char sequence[16];
            CharPtr seqP = sequence;

            StrIToH(sequence, (ULong) c);

            while((*seqP == '0') && seqP)
                seqP++;

            StrToLower(seqP, seqP);

            seqP--;

            seqP[0] = '%';

            if(!copyStringIfRoom(dest + destPos, seqP, (int) (destSize - destPos)))
                return false;

            destPos += (int) StrLen(seqP);
        }
        else
        {
            dest[destPos++] = (Char) c;
        }

        sourcePos++;
    }

    dest[destPos] = '\0';

    return true;
}


ULong
BLUtils::dateToSeconds(const DateType & date)
{
    ULong days = DateToDays(date);

    return days * 24l * 60l * 60l;
}


/*
    Build 224: Cresenda (Alex Klyce). kExpirationDate = {96, 6, 10};
    Build 225: Atlanta potential investors. kExpirationDate = {96, 6, 10};
    Build 226: Cresenda 2
    Build 227: Palm
    Build 228:
    Build 229: Excite
    Build 230: Atlanta Angels
*/

bool
```

```
BLUtils::checkExpirationDate()
{
    ULong seconds = TimGetSeconds();
    ULong expireSeconds = dateToSeconds(kExpirationDate);

    if(seconds < expireSeconds)
        return true;
    else
    {
        FrmCustomAlert(CustomAlert, "Build 230 has expired. Contact jkleid@bluelark.com for
up-to-date version.", "", "");
        return false;
    }
}


// BLUtils.h

#pragma once

#include "BLVectorHeader.h"
#include "BLTypes.h"


    BLUtils
{
  public:

     static  CharPtr cloneString(CharPtr str, UInt extraSpace = 0);
     static  bool    copyStringIfRoom(CharPtr dest, CharPtr source, int destSize);

     static VoidPtr getObjectPtr(Word objectID);

     static FieldPtr getFocusObjectPtr(void);
     static void setFieldToStrResource(Word fieldID, Word strResID);
     static void writeStrToField(Word fieldID, CharPtr str);
     static FieldPtr setFieldTextFromHandle(Word fieldID, Handle txtH);

     static void initBasicDialogForm(FormPtr& frmP,
                                     Word frmID,
                                     FormEventHandlerPtr handlerP,
                                     Word focusFieldID);

     static bool isWhitespace(CharPtr text, int length);
     static bool isWhitespace(Char c);
     static bool isDigit(Char c);
     static bool isHexDigit(Char c);

     static int  getNumericalValue(Char c);
     static int  hexToInt(CharPtr hexString, int &bytesUsed, int bytesAvailable);

     static bool isInsideRectVector(Point p, BLVector<RectangleType, 4> & vector);

     static CharPtr  IPToString(ULong ipAddress);

     static int abs(int i)   { return i > 0 ? i : -i; }
     static long abs(long i) { return i > 0 ? i : -i; }

     static bool checkExpirationDate();

     static ULong dateToSeconds(const DateType & date);

     static bool escapeChars(CharPtr dest, CharPtr source, UInt destSize);
};

class OutOfMemoryException
{
};// BLVector.h

#pragma once

#include <string.h>
#include "BLMemoryManager.h"
#include "BLVectorHeader.h"
```

```
template <class T, int increment_>
BLMemoryManager
BLVector<T, increment_>::sMemManager = NULL;


template <class T, int increment_>
BLVector<T, increment_>::BLVector(int initSize)
{
    if(initSize <= 0)
    {
        mPhysSize = 0;
        mLogSize = 0;
        mElements = NULL;
        return;
    }

    mPhysSize = initSize;
    mLogSize = 0;

    if(!sMemManager)
        mElements = new T[mPhysSize];
    else
        mElements = (T*) sMemManager->newChunk(sizeof(T) * mPhysSize);
}


template <class T, int increment_>
BLVector<T, increment_>::BLVector(const BLVector &original)
{
    mPhysSize = original.mPhysSize;
    mLogSize = original.mLogSize;

    if(mPhysSize == 0)
    {
        mElements = NULL;
        return;
    }

    if(!sMemManager)
        mElements = new T[mPhysSize];
    else
        mElements = (T*) sMemManager->newChunk(sizeof(T) * mPhysSize);

    memcpy(mElements, original.mElements, sizeof(T) * mLogSize);
}


template <class T, int increment_>
BLVector<T, increment_>::~BLVector()
{
    if(!sMemManager)
        delete[] mElements;
}


template <class T, int increment_>
void
BLVector<T, increment_>::add(T item)
{
    expandIfNeeded(mLogSize);

    mElements[mLogSize++] = item;
}


template <class T, int increment_>
void
BLVector<T, increment_>::insert(T item, int pos)
{
    expandIfNeeded(mLogSize);

    MemMove(&mElements[pos+1], &mElements[pos], sizeof(T)*(mLogSize-pos));
    mElements[pos] = item;
    ++mLogSize;
```

```
}


template <class T, int increment_>
T
BLVector<T, increment_>::remove(int pos)
{
    T removedElem = mElements[pos];
    MemMove(&mElements[pos], &mElements[pos+1], sizeof(T)*(mLogSize-pos-1));
    --mLogSize;

    return removedElem;
}


template <class T, int increment_>
void
BLVector<T, increment_>::expandIfNeeded(int newLogSize)
{
    if(mPhysSize <= newLogSize)
    {
        T* temp;

        int newSize = mPhysSize * 2 + increment_;

        if(!sMemManager)
            temp = new T[newSize];
        else
            temp = (T*) sMemManager->newChunk(sizeof(T) * newSize);

        ErrNonFatalDisplayIf(temp == NULL, "Out of memory.");

        if(mElements && temp)
        {
            MemMove(temp, mElements, sizeof(T)*mPhysSize);

            if(!sMemManager)
                delete[] mElements;
        }

        if(temp)
        {
            mElements = temp;

            mPhysSize = newSize;
        }
    }
}


    ate <class T, int increment_>

BLVector<T, increment_>::getElementAt(int index) const
{
    return mElements[index];
}


template <class T, int increment_>
void
BLVector<T, increment_>::deleteAll()
{
    if(!sMemManager)
        delete[] mElements;

    mLogSize = mPhysSize = 0;
    mElements = NULL;
}

// BLVectorHeader.h

#pragma once

#include "size_t.h"
```

```
class BLMemoryManager;
template <class T, int increment_>
class BLVector
{
    public:

                            BLVector(int initSize = increment_);
                            BLVector(const BLVector &original);
        virtual             ~BLVector();

                    void    add(T item);
                    void    insert(T item, int pos);
                    void    replace(T item, int pos) { mElements[pos] = item; }
                    T       remove(int pos);
                    void    removeAll() { mLogSize = 0; }
                    T       removeLast() { if(mLogSize > 0) mLogSize--; return
mElements[mLogSize]; }
                    void    deleteAll();

                    T&      operator[](int index) { return mElements[index]; }
                    T       getElementAt(int index) const;
                    T*      getAllElements() const { return mElements; }
                    int     getNumElements() const { return mLogSize; }
                    T       getLastElement() const {    if(mLogSize <= 0)
                                                            return mElements[0];
                                                        return mElements[mLogSize - 1]; }

                    T       popLastElement()  { if(mLogSize > 0) mLogSize--;
                                                return mElements[mLogSize]; }

        static  void    setMemManager(BLMemoryManager * memMan) { sMemManager = memMan; }

    protected:

        static  BLMemoryManager * sMemManager;

                void    expandIfNeeded(int newLogSize);

                T*      mElements;
                int     mPhysSize;
                int     mLogSize;

};
// BLView.cpp

#include "BLView.h"


BLView::BLView()
{
}

BLView::~BLView()
{
}

void
BLView::erase()
{
    RectangleType bounds = getBounds();

    WinEraseRectangle(&bounds, 0);
}// BLView.h

#pragma once

#include "BLEventHandler.h"

class BLView : public BLEventHandler
{
    public:

                                BLView();
        virtual                 ~BLView();

        virtual void            open() = 0;
```

```
        virtual bool              doesHandleType(EventClasses event)
                                  { return event == kUIType; }

        virtual Boolean           handleEvent(EventPtr eventP) = 0;

        virtual RectangleType     getBounds() = 0;

        virtual void              draw() = 0;

        virtual void              erase();
};// BLWMLActions.cpp

#include "BLWMLActions.h"
#include "BLWMLSession.h"
#include "BLUtils.h"

const CharPtr kURLEncode = "application/x-www-form-urlencoded";

const int kWapTicksPerSecond = 10;

cor   int kURLBufferLen = 256;

WM.    .WMLGo()
{
    mHref =          NULL;
    mSendReferer =   false;
    mMethod =        kGet;
    mEncodingType = kURLEncode;
    mAcceptCharset =NULL;
}


WMLGo::WMLGo(BLGlyph * parent, const WMLGo &original)
:   WMLAction(parent)
{
    mHref =          original.mHref;
    mSendReferer =   original.mSendReferer;
    mMethod =        original.mMethod;
    mEncodingType = original.mEncodingType;
    mAcceptCharset =original.mAcceptCharset;
}


void
WMLGo::activate()
{
    WMLHyperlink link(mHref);

      nk.activate();
}


void
WMLPrevious::activate()
{
    BLGlyph::getSession()->goBack();
}


void
WMLRefresh::activate()
{
    BLGlyph::getSession()->refresh();
}


WMLHyperlink::WMLHyperlink(const WMLHyperlink &link)
{
    mHref = link.mHref;
}


void
WMLHyperlink::activate()
```

```
    if(mHref != NULL)
    {
        Char urlBuffer[kURLBufferLen];
        Char urlBuffer2[kURLBufferLen];

        CharPtr tempBuffer = urlBuffer;
        CharPtr escapedString = NULL;

        UInt bufLength = kURLBufferLen;
        UInt escapeBufLength = 0;

        WMLVariables * vars = BLGlyph::getSession()->getVars();

        if(!vars->insertVariables(tempBuffer, mHref, kURLBufferLen))
        {
            bufLength = kURLBufferLen * 5;
            tempBuffer = new Char[bufLength];

            if(!tempBuffer)
                return;

            if(!vars->insertVariables(tempBuffer, mHref, bufLength))
                goto QUIT;

            escapeBufLength = (StrLen(tempBuffer) * 3) / 2;
            escapedString = new Char[escapeBufLength];
        }
        else
        {
            escapedString = urlBuffer2;
            escapeBufLength = kURLBufferLen;
            tempBuffer = urlBuffer;
        }

        if(!BLUtils::escapeChars(escapedString, tempBuffer, escapeBufLength))
        {
            if(escapedString != urlBuffer2)
                delete [] escapedString;

            escapeBufLength *= 2;
            escapedString = new Char[escapeBufLength];

            if(!escapedString)
                goto QUIT;

            if(!BLUtils::escapeChars(escapedString, tempBuffer, escapeBufLength))
            {
                goto QUIT;
            }
        }

        if(StrNCaselessCompare(escapedString, "mailto:", StrLen("mailto:")) == 0)
            BLGlyph::getSession()->mailTo(escapedString);
        else
            BLGlyph::getSession()->goTo(escapedString, true);

QUIT:

        if(tempBuffer != urlBuffer)
            delete [] tempBuffer;

        if(escapedString != urlBuffer2)
            delete [] escapedString;
    }
}


WMLDo::WMLDo()
{
    mType =          kUnknown;
    mName =          NULL;
    mLabel =         NULL;
    mIsOptional =    false;
}
```

```
WMLDo::WMLDo(BLGlyph * parent, const WMLDo &original)
:   WMLAction(parent)
{
    mType =         original.mType;
    mName =         original.mName;
    mLabel =        original.mLabel;
    mIsOptional =   original.mIsOptional;
}


WMLAnchor::WMLAnchor()
{
    mTitle =    NULL;
    mAccessKey =NULL;
    mAction =   NULL;
}


WMLAnchor::WMLAnchor(BLGlyph * parent, const WMLAnchor& original)
:   WMLAction(parent)
{
      .tle =    original.mTitle;
    mAccessKey =original.mAccessKey;
    mAction =   original.mAction;
}


WMLTimer::WMLTimer(WMLCard * parent, ULong value)
:   BLGlyph(parent)
{
    mEnclosingCard =parent;
    mValue =        value;
    mTickValue =    (SysTicksPerSecond() / kWapTicksPerSecond) * mValue;
    mOriginalTicks =0;
    mIsTicking =    false;

    parent->setTimer(this);
}


void
WMLTimer::start()
{
    mOriginalTicks = TimGetTicks();
    mIsTicking = true;
    BLGlyph::getSession()->setTimer(mTickValue, this);
}


vc
WMLTimer::stop()
{
    mIsTicking = false;
}


bool
WMLTimer::checkTime()
{
    ULong currentTime = TimGetTicks();

    if(mIsTicking && ((mOriginalTicks + mTickValue) <= currentTime))
    {
        WMLAction * action = mEnclosingCard->getIntrinsicEvents().mOnTimer;

        if(action != NULL)
            action->activate();

        return true;
    }

    return false;
}
```

```
WMLSetvar::WMLSetvar()
{
    mName = NULL;
    mValue = NULL;
}


WMLSetvar::WMLSetvar(BLGlyph * parent, const WMLSetvar& original)
:   WMLAction(parent)
{
    mName = original.mName;
    mValue = original.mValue;
}


void
WMLSetvar::activate()
{
    WMLVariables * vars = getSession()->getVars();
    vars->add(mName, mValue);
}


WMLPostfield::WMLPostfield()
{
    mName = NULL;
    mValue = NULL;
}


WMLPostfield::WMLPostfield(BLGlyph * parent, const WMLPostfield& original)
:   WMLAction(parent)
{
    mName = original.mName;
    mValue = original.mValue;
}


void
WMLPostfield::activate()
{

}

// BLWMLActions.h

#pragma once

#include "BLGlyph.h"

class WMLAction : public BLGlyph
{
    public:
                    WMLAction(BLGlyph * parent = NULL) : BLGlyph(parent) {}

        virtual void activate() = 0;

        virtual void setAction(WMLAction * /*action*/) {}
        virtual WMLAction * getAction() { return NULL; }
};

class WMLPrevious : public WMLAction
{
    public:
                    WMLPrevious(BLGlyph * parent) : WMLAction(parent) {}

        virtual void    activate();
};
```

```
class WMLRefresh: public WMLAction
{
    public:
                        WMLRefresh(BLGlyph * parent) : WMLAction(parent) {}

        virtual void    activate();

};

class WMLHyperlink : public WMLAction
{
    public:
                        WMLHyperlink(CharPtr url = NULL) { mHref = url; }
                        WMLHyperlink(const WMLHyperlink &link);

        virtual void    activate();

        CharPtr mHref;
};

c.ass WMLGo : public WMLAction
{
    public:
        enum HTTPMethod { kGet, kPost};

                        WMLGo();
                        WMLGo(BLGlyph * parent, const WMLGo &original);

        virtual void    activate();

        friend  class   WBXMLParser;

    protected:

                CharPtr     mHref;
                bool        mSendReferer;
                HTTPMethod  mMethod;
                CharPtr     mEncodingType;
                CharPtr     mAcceptCharset; // !!! deal with this later
};

class WMLDo : public WMLAction
{
    public:
        enum DoType { kUnknown = 0, kAccept, kPrev, kHelp, kReset, kOptions, kDelete };

                        WMLDo();
                        WMLDo(BLGlyph * parent, const WMLDo &original);

        virtual void    activate()
                        {   if(mAction) mAction->activate(); }

        virtual void    setAction(WMLAction * action)
                        {   mAction = action;   }

        virtual WMLAction * getAction() { return mAction; }

        friend  class   WBXMLParser;
        friend  class   WMLCard;

    protected:

                WMLAction   * mAction;

                DoType  mType;
                CharPtr mName;
                CharPtr mLabel;
                bool    mIsOptional;
```

```
class WMLOnEvent : public WMLAction
{
    public:
                        WMLOnEvent(BLGlyph * parent) : WMLAction(parent) {}

        virtual void    activate()
                        {   if(mAction) mAction->activate(); }

        virtual void    setAction(WMLAction * action)
                        {   mAction = action;   }

        virtual WMLAction * getAction() { return mAction; }

    protected:

                WMLAction   * mAction;

};

class WMLAnchor : public WMLAction
{
    public:
                        WMLAnchor();
                        WMLAnchor(BLGlyph * parent, const WMLAnchor& original);

        virtual void    activate()
                        {   if(mAction) mAction->activate(); }

        virtual void    setAction(WMLAction * action)
                        {   mAction = action;   }

        virtual WMLAction * getAction() { return mAction; }

        virtual BLVector<BLGlyph*, kChildrenInc> * children()
                { return &mChildren; }

        friend  class   WBXMLParser;

    protected:

                BLVector<BLGlyph*, kChildrenInc>   mChildren;

                WMLAction   * mAction;

                CharPtr mTitle;
                CharPtr mAccessKey;
};

class WMLTimer : public BLGlyph, public Timer
{
    public:
                        WMLTimer(WMLCard * parent, ULong value);

        virtual void    start();
        virtual void    stop();

        virtual bool    checkTime();

    protected:

        WMLCard * mEnclosingCard;

        ULong   mValue;
        ULong   mTickValue;
        ULong   mOriginalTicks;

        bool    mIsTicking;
```

```
};

class WMLHead : public BLGlyph
{
    public:

                WMLHead(BLGlyph * parent) : BLGlyph(parent) {}
};

class WMLTemplate : public BLGlyph
{
    public:
                    WMLTemplate(BLGlyph * parent) : BLGlyph(parent), mEvents() {}

            WMLIntrinsicEvents  &getIntrinsicEvents() { return mEvents; }

        friend  class   WBXMLParser;

    protected:

        WMLIntrinsicEvents  mEvents;
}.

class WMLSetvar : public WMLAction
{
    public:
                            WMLSetvar();
                            WMLSetvar(BLGlyph * parent, const WMLSetvar& original);

            virtual void    activate();

            friend  class   WBXMLParser;

    protected:

        CharPtr     mName;
        CharPtr     mValue;
};

class WMLPostfield : public WMLAction
{
    public:
                            WMLPostfield();
                            WMLPostfield(BLGlyph * parent, const WMLPostfield& original);

            virtual void    activate();

            friend  class   WBXMLParser;

    protected:

        CharPtr     mName;
        CharPtr     mValue;
};
// BLWMLForm.cpp

#include "BLWMLForm.h"
#include "BLWMLView.h"
#include "BLIterator.h"
#include "BLPrefs.h"
#include "BLNetworking.h"
#include <ScrDriver.h>

BLWMLForm::BLWMLForm(   BLNetworking * networkingP,
                        UInt    supportedFormID,
                        UInt    viewGadgetID,
                        UInt    vScrollBarID,
                        UInt    hScrollBarID)
 :  BLForm(supportedFormID)
```

```
{
    mSupportedFormID = supportedFormID;
    mViewGadgetID = viewGadgetID;
    mVScrollBarID = vScrollBarID;
    mHScrollBarID = hScrollBarID;

    mbookmarkP = new BLBookmark();
    mWMLSession = NULL;
    mNetworkingP = networkingP;

    mIsOpened = false;
}

BLWMLForm::~BLWMLForm()
{
}

void
BLWMLForm::formLoad(FormPtr formP)
{
    BLForm::formLoad(formP);

    RectangleType   rect;
    mWMLSession = new BLWMLSession(mNetworkingP);

    DWord depth = 2;

    if(mNetworkingP->getNetLibType() != BLNetworking::kINetLib)
        ScrDisplayMode(scrDisplayModeSet, NULL, NULL, &depth, NULL);

    FrmGetObjectBounds( mFormPtr,
                        FrmGetObjectIndex(mFormPtr, mViewGadgetID),
                        &rect);

    BLWMLView * wmlView = new BLWMLView(this, mWMLSession, rect, mVScrollBarID,
mHScrollBarID);
    mWMLSession->setView(wmlView);

    addView(wmlView);

    mFocus = wmlView;

    mbookmarkP->updateBookmarksPopup(MainBookmarksPopListList);
}

void
BLWMLForm::formOpen()
{
    mIsOpened = true;

    FrmSetTitle(mFormPtr, BLUtils::cloneString("Blazer"));

    BLForm::formOpen();

    if(mFocus)
        mFocus->open();
}

void
BLWMLForm::formClose()
{
    if(mIsOpened)
    {
        mIsOpened = false;

        delete[] FrmGetTitle(mFormPtr);

        BLIterator<BLView*, kViewsInc> iter(mViews);

        delete mWMLSession;
```

```
        mWMLSession = NULL;

        while(iter.hasNext())
        {
            delete iter.getNext();
        }
    }
}


Boolean
BLWMLForm::handleEvent(EventPtr eventP)
{
    Boolean handled = BLForm::handleEvent(eventP);

    switch(eventP->eType)
    {
        case ctlSelectEvent:
            BLWMLView * view = (BLWMLView *) mViews.getElementAt(0);
            switch(eventP->data.ctlSelect.controlID)
            {
                case MainLeftArrowButton:
                    mWMLSession->goBack();
                    handled = true;
                    break;

                case MainRightArrowButton:
                    mWMLSession->goForward();
                    handled = true;
                    break;

                case MainHomeButton:
                    mWMLSession->goHome();
                    handled = true;
                    break;

                case MainOpenButton:
                    doGotoPageDialog();
                    handled = true;
                    break;
            }
            break;

        case menuEvent:
            handled = doCommand(eventP->data.menu.itemID);
            break;

        case popSelectEvent:
            handled = bookmarkPopupHandleEvent(eventP);
            break;

    return handled;
}


Boolean
BLWMLForm::doCommand(Word command)
{
    Boolean handled = false;
    FormPtr frmP;

    switch(command)
    {
        case BrowserPageGoto:
            doGotoPageDialog();
            if(mFocus)
                mFocus->draw();
            handled = true;
            break;

        case BrowserEditBookmarks:
            doBookmarksEditDialog();
            if(mFocus)
                mFocus->draw();
```

```
            handled = true;
            break;

        // nav commands
        case BrowserPageBack:
            mWMLSession->goBack();
            handled = true;
            break;

        case BrowserPageForward:
            mWMLSession->goForward();
            handled = true;
            break;

        case BrowserPageHome:
            mWMLSession->goHome();
            handled = true;
            break;

        case BrowserPageStop:
            handled = true;
            break;

        /*
        case BrowserPageReload:
            handled = true;
            break;
        */

        case OptionsPreferences:
            doPrefsPageDialog();
            handled = true;
            break;

        case OptionsAboutBlazer:
            MenuEraseStatus(0);
            frmP = FrmInitForm(BlazerAboutForm);
            FrmDoDialog(frmP);
            FrmDeleteForm(frmP);
            if(mFocus)
                mFocus->draw();
            handled = true;
            break;
        /*
        // Text Selection
        case BrowserEditCut:            // Do a cut to the clipboard if text is highlighted.
            fldP = BLUtils::getFocusObjectPtr();
            if (fldP)
                FldCut(fldP);
            handled = true;
            break;

        case BrowserEditPaste:          // Copy the highlighted text to the clipboard.
            fldP = BLUtils::getFocusObjectPtr();
            if (fldP)
                FldCopy(fldP);
            handled = true;
            break;

        case BookmarkEditPaste:         // Do a paste from the clipboard.
            fldP = BLUtils::getFocusObjectPtr();
            if (fldP)
                FldPaste(fldP);
            handled = true;
            break;

        case BrowserEditSelectAll:      // Select all the existing text.
            fldP = BLUtils::getFocusObjectPtr();
            if (fldP)
                FldSetSelection(fldP, 0, FldGetTextLength(fldP));
            handled = true;
            break;*/
    }
    return handled;
}
```

```
Boolean
BLWMLForm::bookmarkPopupHandleEvent(EventPtr eventP)
{
    ListPtr lstP;
    Word indexSelected, lastIndexSelected, numElems;
    Boolean handled = false;
    Word id = 0;
    BLWMLView* view = 0;

    lstP = (ListPtr) eventP->data.popSelect.listP;
    numElems = LstGetNumberOfItems(lstP);
    indexSelected = eventP->data.popSelect.selection;
    lastIndexSelected = eventP->data.popSelect.priorSelection;

    // go to edit bookmarks form if the user selected the last item
    if (indexSelected == (numElems - 1))
    {
        doBookmarksEditDialog();
        handled = true;

      otherwise go to the associated url
    .se
    {
        CharPtr url = mbookmarkP->getUrl(indexSelected);
        if((mWMLSession != NULL) && (url != NULL))
        {
            mWMLSession->goTo(url, false);

            handled = true;
        }

        delete[] url;
    }
    return handled;
}


void
BLWMLForm::doGotoPageDialog(void)
{
    FormPtr previousForm, frmP;

    previousForm = FrmGetActiveForm();
    BLUtils::initBasicDialogForm(frmP, GotoPageForm, gotoPageWrapper, GotoPageURLField);
    CharPtr lastUrl;
    if((lastUrl = mbookmarkP->getLastOpenUrlP()) == NULL)
        BLUtils::setFieldToStrResource(GotoPageURLField, DefaultProtocolString);
     lse

        BLUtils::writeStrToField(GotoPageURLField, lastUrl);
        UInt startHilite = 0;
        UInt endHilite = StrLen(lastUrl);

        if(StrNCaselessCompare(lastUrl, "http://", StrLen("http://")) == 0)
            startHilite = StrLen("http://");

        FldSetSelection((FieldPtr) FrmGetObjectPtr(frmP, FrmGetObjectIndex(frmP,
GotoPageURLField)),
                startHilite, endHilite);
    }

    mbookmarkP->initGotoPageDialog();
    FrmDoDialog(frmP);

    CharPtr url = BLUtils::cloneString(mbookmarkP->getOpenUrl());

    FrmDeleteForm(frmP);
    FrmSetActiveForm(previousForm);

    if(url)
        mWMLSession->goTo(url, false);
    else if(mFocus)
        mFocus->draw();
```

```
void
BLWMLForm::doBookmarksEditDialog(void)
{
    FormPtr previousForm, frmP;

    previousForm = FrmGetActiveForm();
    BLUtils::initBasicDialogForm(frmP, BookmarksEditForm, bookmarksEditWrapper, NULL);
    mbookmarkP->initBookmarkEditForm(BookmarksEditListList);
    FrmDoDialog(frmP);
    FrmDeleteForm(frmP);
    FrmSetActiveForm(previousForm);
    // update the bookmarks list for the popup
    mbookmarkP->updateBookmarksPopup(MainBookmarksPopListList);

    if(mFocus)
        mFocus->draw();
}


void
BLWMLForm::doPrefsPageDialog(void)
{
    FormPtr previousForm, frmP;

    previousForm = FrmGetActiveForm();
    BLUtils::initBasicDialogForm(frmP, PreferencesForm, NULL, 0);
    BLUtils::writeStrToField(PreferencesServerField, BLPrefs::sPrefs.mServerAddress);

    CtlSetValue((ControlPtr)BLUtils::getObjectPtr(PreferencesShowImagesCheckbox),
BLPrefs::sPrefs.mShowImages);

    if(FrmDoDialog(frmP) == PreferencesOKButton)
    {
        CharPtr serverAddressP = FldGetTextPtr((FieldPtr)
BLUtils::getObjectPtr(PreferencesServerField));

        if(serverAddressP)
        {
            StrCopy(BLPrefs::sPrefs.mServerAddress, serverAddressP);
        }
    }

    BLPrefs::sPrefs.mShowImages =
(CtlGetValue((ControlPtr)BLUtils::getObjectPtr(PreferencesShowImagesCheckbox)) != 0);

    FrmDeleteForm(frmP);
    FrmSetActiveForm(previousForm);
}


Boolean
BLWMLForm::gotoPageWrapper(EventPtr eventP)
{
    return mbookmarkP->gotoPageHandleEvent(eventP);
}


Boolean
BLWMLForm::bookmarksEditWrapper(EventPtr eventP)
{
    return mbookmarkP->bookmarksEditHandleEvent(eventP);
}

Boolean
BLWMLForm::prefPageHandler(EventPtr eventP)
{
    Boolean handled = false;
    Boolean showImages = false;

    switch (eventP->eType)
    {
        case ctlSelectEvent:
```

```
        if (eventP->data.ctlEnter.controlID == PreferencesOKButton)
        {
            // Get the current setting of the show images checkbox.
        }
        break;
    }

    return(handled);
}


// BLWMLForm.h

#include "BLForm.h"
#include "BLWMLSession.h"
#include "BLBookmark.h"
#include "BLNetworking.h"

static BLBookmark* mbookmarkP;

class BLWMLForm : public BLForm
{
    ublic:

                        BLWMLForm(  BLNetworking * networkingP,
                                    UInt    supportedFormID,
                                    UInt    viewGadgetID,
                                    UInt    vScrollBarID,
                                    UInt    hScrollBarID);
        virtual         ~BLWMLForm();

        virtual void    formLoad(FormPtr formP);
        virtual void    formOpen();
        virtual void    formClose();

        virtual Boolean handleEvent(EventPtr eventP);

    protected:

        BLWMLSession *  mWMLSession;

        bool    mIsOpened;

        UInt    mSupportedFormID;
        UInt    mViewGadgetID;
        UInt    mVScrollBarID;
        UInt    mHScrollBarID;
        BLNetworking *  mNetworkingP;

        Boolean         doCommand(Word command);
        Boolean         bookmarkPopupHandleEvent(EventPtr eventP);

        void            doGotoPageDialog(void);
        void            doBookmarksEditDialog(void);
        void            doPrefsPageDialog(void);

        static Boolean  gotoPageWrapper(EventPtr eventP);
        static Boolean  bookmarksEditWrapper(EventPtr eventP);
        static Boolean  prefPageHandler(EventPtr eventP);
};// BLWMLInput.cpp

#include "BLWMLInput.h"
#include "BLWMLActions.h"
#include "BLGlyph.h"
#include "BLUtils.h"
#include "BLWMLSession.h"

const UInt kCheckboxSize = 6;
const Int kListID = 2222;
const Int kTriggerID = 1111;
const Int kMinWidth = 10;

WMLFieldSet::WMLFieldSet()
{
    mTitle = NULL;
```

```
}

WMLFieldSet::WMLFieldSet(BLGlyph * parent, const WMLFieldSet& original)
:   BLGlyph(parent)
{
    mTitle = original.mTitle;
}


WMLInput::WMLInput()
{
    mName =      NULL;
    mValue =     NULL;
    mAccessKey =NULL;
    mTitle =     NULL;
    mFormat =    NULL;
    mSize =      -1;
    mMaxLength =-1;
    mTabIndex = -1;
    mType =      kText;
    mEmptytok = false;
}


WMLInput::WMLInput(BLGlyph * parent, const WMLInput& original)
:   WMLLineElement(parent)
{
    mName =      original.mName;
    mValue =     original.mValue;
    mAccessKey =original.mAccessKey;
    mTitle =     original.mTitle;
    mFormat =    original.mFormat;
    mSize =      original.mSize;
    mMaxLength =original.mMaxLength;
    mTabIndex = original.mTabIndex;
    mType =      original.mType;
    mEmptytok = original.mEmptytok;

    WMLVariables * vars = getSession()->getVars();
    mTextEntered = BLUtils::cloneString(vars->lookup(mName));

    if(!mTextEntered)
    {
        mTextEntered = BLUtils::cloneString(mValue);

        if(mTextEntered)
            vars->add(mName, mTextEntered);
    }
}


void
WMLInput::draw( const RectangleType & displayArea,
                const Point &offset)
{
    RectangleType rect;

    rect.topLeft = Point(displayArea.topLeft) - offset;

    rect.topLeft.x++;
    rect.topLeft.y++;

    rect.extent = getExtent(displayArea.extent);

    rect.extent.x -= 2;
    rect.extent.y -= 2;

    WinDrawGrayRectangleFrame(rectangleFrame, &rect);

    if(mTextEntered != NULL)
    {
        TextState::enableBasicState();

        if(mType == kText)
```

```
        WinDrawTruncChars(mTextEntered, StrLen(mTextEntered), ++rect.topLeft.x,
rect.topLeft.y, --rect.extent.x);
      else if((mType == kPassword) && (mTextEntered[0] != '\0'))
      {
        CharPtr starChars = "************";
        WinDrawTruncChars(starChars, StrLen(starChars), ++rect.topLeft.x, rect.topLeft.y,
--rect.extent.x);
      }
    }
}


void
WMLInput::computeMetrics(int lineWidth)
{
    mLineWidth = lineWidth;
}


bool
WMLInput::click(const RectangleType & displayArea,
                const Point &offset,
                PointType p)
{
    bool inRect = false;

    RectangleType rect = WMLLineElement::getArea(displayArea, offset);

    Point pt(p);

    inRect = pt.isInside(rect);

    if(inRect && (BLGlyph::sHiliteAction == kFindSelection))
        BLGlyph::sClickedAction = this;
    else if((BLGlyph::sClickedAction == this))
    {
        BLGlyph::sActiveRectVector.add(rect);
        WinInvertRectangle(&rect, 0);
    }

    return inRect;
}


void
WMLInput::activate()
{
    // show text entry window

     xtState::enableBasicState();

    if(doInputDialog())
    {
        WMLVariables * vars = getSession()->getVars();
        vars->add(mName, mTextEntered);

        BLGlyph::getSession()->refresh(true);
    }
}


Point
WMLInput::getExtent(const Point &/*areaExtent*/)
{
    TextState::enableBasicState();

    Point extent;
    LineMetrics metrics = getMetrics();

    extent.x = metrics.width;
    extent.y = metrics.height();

    return extent;
}
```

```
LineMetrics
WMLInput::getMetrics()
{
    TextState::enableBasicState();

    LineMetrics metrics;

    metrics.leadingSpace = 0;
    metrics.width = mLineWidth;
    metrics.baselineOffset = FntBaseLine() + 1;
    metrics.overhang = FntDescenderHeight() + 1;

    return metrics;
}


Boolean
WMLInput::bookmarksAddHandleEvent(EventPtr /*eventP*/)
{
    Boolean handled = false;

    return handled;
}


bool
WMLInput::doInputDialog()
{
    bool valueChanged = false;

    FormPtr frmP, previousForm;

    previousForm = FrmGetActiveForm();

    BLUtils::initBasicDialogForm(frmP, TextEntryForm, bookmarksAddHandleEvent,
TextEntryTextField);

    if(mTextEntered != NULL)
        BLUtils::writeStrToField(TextEntryTextField, mTextEntered);

    if(FrmDoDialog(frmP) == TextEntryOKButton)
    {
        CharPtr serverAddressP = FldGetTextPtr((FieldPtr)
BLUtils::getObjectPtr(TextEntryTextField));

        delete [] mTextEntered;
        mTextEntered = BLUtils::cloneString(serverAddressP);

        valueChanged = true;
    }

    FrmDeleteForm(frmP);
    FrmSetActiveForm(previousForm);

    return valueChanged;
}


WMLSelect::WMLSelect()
{
    mTitle =     NULL;
    mName =      NULL;
    mValue =     NULL;
    mIName =     NULL;
    mIValue =    NULL;
    mTabIndex = -1;
    mType =      kRadioButtons;

    mSelectedP = NULL;
    mPreviousSelectedP = NULL;

    mNumOptions = 0;
}
```

```
WMLSelect::WMLSelect(BLGlyph * parent, const WMLSelect& original)
:   WMLLineElement(), BLParentGlyph(parent)
{
    mTitle =    original.mTitle;
    mName =     original.mName;
    mValue =    original.mValue;
    mIName =    original.mIName;
    mIValue =   original.mIValue;
    mTabIndex = original.mTabIndex;
    mType =     original.mType;

    mSelectedP =            original.mSelectedP;
    mPreviousSelectedP =    original.mPreviousSelectedP;

    mNumOptions =   original.mNumOptions;
}


void
WMLSelect::setSelected(WMLOption * selectedP)
{
     electedP = selectedP;
}



void
WMLSelect::computeMetrics(int lineWidth)
{
    mLineWidth = lineWidth;
}



bool
WMLSelect::click(   const RectangleType & displayArea,
                    const Point &offset,
                    PointType p)
{
    bool inRect = false;

    RectangleType rect = WMLLineElement::getArea(displayArea, offset);
    Point pt(p);

    inRect = pt.isInside(rect);

    if(BLGlyph::sHiliteAction == kFindSelection)
    {
        if(inRect)
        {
            BLGlyph::sClickedAction = this;
            return true;
        }
        else
            return false;
    }
    else if((BLGlyph::sClickedAction == this) &&
            (BLGlyph::sHiliteAction == kHilite))
    {
        BLGlyph::sActiveRectVector.add(rect);

        WinInvertRectangle(&rect, 0);

        return true;
    }
    else if(BLGlyph::sHiliteAction == kUnhilite)
    {
        WinInvertRectangle(&rect, 0);

        if(inRect)
        {
            CharPtr * items = new CharPtr[mNumOptions];
            int widthNeeded;
```

```
            if(mTitle)
                widthNeeded = FntCharsWidth(mTitle, StrLen(mTitle));

            if(widthNeeded < kMinWidth)
                widthNeeded = kMinWidth;

            for(int i=0; i<mNumOptions; i++)
            {
                WMLOption * optionP = dynamic_cast<WMLOption *>(children()->getElementAt(i));

                if(optionP == NULL)
                {
                    items[i] = NULL;
                    continue;
                }

                items[i] = optionP->getTitle();

                int width = FntCharsWidth(items[i], StrLen(items[i])) + 5;

                if(widthNeeded < width)
                    widthNeeded =  width;
            }

            if(widthNeeded > mLineWidth)
                widthNeeded = mLineWidth;

            FormPtr activeP = FrmGetActiveForm();

            Err err = LstNewList(   &activeP,
                                    kListID, // list id,
                                    displayArea.topLeft.x,
                                    displayArea.topLeft.y,
                                    widthNeeded,
                                    displayArea.extent.y,
                                    stdFont,
                                    min(displayArea.extent.y / FntLineHeight(), mNumOptions),
                                    kTriggerID);    // triggerId

            if(err)
                return true;

            ListPtr listP = (ListPtr) BLUtils::getObjectPtr(kListID);

            LstSetListChoices(listP, items, mNumOptions);

            short selection = LstPopupList(listP);

            err = FrmRemoveObject(&activeP, FrmGetObjectIndex(activeP, kListID));

            getSession()->getView()->refreshFormPointer();

            return true;
        }
        else
            return false;
    }

    return false;
}


void
WMLSelect::draw(const RectangleType & displayArea,
                const Point &offset)
{
    RectangleType rect = displayArea;

    rect.topLeft.x = displayArea.topLeft.x - offset.x;
    rect.topLeft.y = displayArea.topLeft.y - offset.y;

    if(mType == kPopupList)
    {
        VoidHand handle = DmGetlResource('Tbmp', DownArrowBitmap);
        BitmapPtr bitmapP = (BitmapPtr) MemHandleLock(handle);
```

```
    WinDrawBitmap(bitmapP, rect.topLeft.x, rect.topLeft.y);

    UInt startPos = bitmapP->width;

    MemHandleUnlock(handle);
    DmReleaseResource(handle);

    CharPtr text;

    if(getSelected())
        text = getSelected()->getTitle();
    else
        text = getTitle();

    if(text != NULL)
    {
        TextState::enableBasicState();

        WinDrawChars(   (ConstCharPtr) text, StrLen(text),
                        rect.topLeft.x + startPos,
                        rect.topLeft.y);
    }

}


Point
WMLSelect::getExtent(const Point &areaExtent)
{
    TextState::enableBasicState();

    return Point(mLineWidth, FntLineHeight());
}


LineMetrics
WMLSelect::getMetrics()
{
    LineMetrics metrics;

    Point extent = getExtent(Point::sZeroPoint());

    metrics.width =          extent.x;
    metrics.baselineOffset =extent.y;
    metrics.overhang =       0;
    metrics.leadingSpace = 0;

    return metrics;
}


void
WMLSelect::activate()
{
}


WMLOptgroup::WMLOptgroup()
{
    mTitle = NULL;
}


WMLOptgroup::WMLOptgroup(BLGlyph * parent, const WMLOptgroup& original)
:   BLGlyph(parent)
{
    mTitle = original.mTitle;
}


RectangleType
WMLOption::sLastSelectionArea;

WMLOption::WMLOption(WMLSelect * currSelectP)
```

```
{
    mSelectP = currSelectP;

    mValue = NULL;
    mTitle = NULL;
    mOnPick = NULL;
    mIsSelected = false;
}


WMLOption::WMLOption(BLGlyph * parent, const WMLOption& original)
:   BLParentGlyph(parent), WMLLineElement()
{
    mSelectP =  original.mSelectP;
    mValue =    original.mValue;
    mTitle =    original.mTitle;
    mOnPick =   original.mOnPick;

    mIsSelected =original.mIsSelected;
}


void
WMLOption::draw(const RectangleType & displayArea,
                const Point &offset)
{
    RectangleType rect;

    rect.topLeft.x = displayArea.topLeft.x - offset.x + 1;
    rect.topLeft.y = displayArea.topLeft.y - offset.y + 1;

    rect.extent.x = rect.extent.y = kCheckboxSize;

    if(mSelectP->mType == WMLSelect::kCheckboxes)
    {
        WinDrawRectangleFrame(rectangleFrame, &rect);

        if(mIsSelected)
        {
            CustomPatternType pattern;
            MemSet(&pattern, sizeof(pattern), 0xFF);
            WinSetPattern(pattern);

            WinFillRectangle(&rect, 0);
        }
    }
    else if(mSelectP->mType == WMLSelect::kRadioButtons)
    {
        rect.extent.x++;
        rect.extent.y++;

        WinDrawRectangleFrame(roundFrame, &rect);

        if(mSelectP->getSelected() == this)
        {
            CustomPatternType pattern;
            MemSet(&pattern, sizeof(pattern), 0xFF);
            WinSetPattern(pattern);

            rect.topLeft.x++;
            rect.topLeft.y++;
            rect.extent.x -= 2;
            rect.extent.y -= 2;

            WinFillRectangle(&rect, 3);
        }
    }
}


Point
WMLOption::getExtent(const Point &/*areaExtent*/)
{
    Point extent;
```

```
    extent.x = kCheckboxSize + 4;
    extent.y = FntLineHeight();

    return extent;
}


LineMetrics
WMLOption::getMetrics()
{
    LineMetrics metrics;

    Point extent = getExtent(Point::sZeroPoint());

    metrics.width =             extent.x;
    metrics.baselineOffset =extent.y - FntDescenderHeight() - 1;
    metrics.overhang =          FntDescenderHeight() + 1;
    metrics.leadingSpace = 0;

    return metrics;
}


v
WMLOption::activate()
{
    WMLVariables * vars = getSession()->getVars();

    if(mSelectP->mType == WMLSelect::kRadioButtons)
    {
        vars->add(mSelectP->mName, getValue());
    }
    else if(mSelectP->mType == WMLSelect::kCheckboxes)
    {
        // !!! What to do here?
    }

    if(mOnPick != NULL)
    {
        WMLHyperlink link;
        link.mHref = mOnPick;
        link.activate();
    }
}


bool
WMLOption::click(   const RectangleType & displayArea,
                    const Point &offset,
                    PointType p)

    pool inRect = false;
    bool doDraw = false;

    RectangleType rect = WMLLineElement::getArea(displayArea, offset);

    Point pt(p);

    inRect = pt.isInside(rect);

    if(BLGlyph::sHiliteAction == kFindSelection)
    {
        if(mSelectP->mType == WMLSelect::kCheckboxes)
        {
            if(inRect)
            {
                BLGlyph::sClickedAction = this;
                return true;
            }
            else
                return false;
        }
        else if(mSelectP->mType == WMLSelect::kRadioButtons)
        {
            if(inRect)
```

```
            {
                if(mSelectP->getSelected())
                {
                    BLGlyph::sClickedAction = mSelectP->getSelected();
                    mSelectP->setPreviousSelected(mSelectP->getSelected());
                }
                else
                {
                    BLGlyph::sClickedAction = this;
                    mSelectP->setPreviousSelected(NULL);
                }

                sLastSelectionArea = displayArea;
                sLastSelectionArea.topLeft.x -= offset.x;
                sLastSelectionArea.topLeft.y -= offset.y;

                mSelectP->setSelected(this);

                if(mSelectP->getPreviousSelected() == NULL)
                    BLGlyph::sClickedAction = this;

                doDraw = true;
                BLGlyph::sActiveRectVector.add(rect);
            }
            else return false;
        }
    }
    else if((BLGlyph::sClickedAction == this) &&
            (BLGlyph::sHiliteAction == kHilite))
    {
        if(mSelectP->mType == WMLSelect::kCheckboxes)
        {
            BLGlyph::sActiveRectVector.add(rect);
            doDraw = true;

            mIsSelected = !mIsSelected;
        }
        else if(mSelectP->mType == WMLSelect::kRadioButtons)
        {
            if((this == mSelectP->getSelected()) &&
                (mSelectP->getPreviousSelected() == NULL) )
            {
                return false;
            }

            if( (this == mSelectP->getSelected()) &&
                (mSelectP->getSelected() != mSelectP->getPreviousSelected()))
                return false;

            // The previously selected actually == sClickedAction (confusing, yes)

            doDraw = false;
            WMLOption * selectedOptionP = mSelectP->getSelected();

            if(selectedOptionP)
            {
                sLastSelectionArea = displayArea;
                sLastSelectionArea.topLeft.x -= offset.x;
                sLastSelectionArea.topLeft.y -= offset.y;

                sClickedAction = selectedOptionP;  // change it back to what it should be.
            }

            inRect = true;
        }
    }
    else if(BLGlyph::sHiliteAction == kUnhilite)
    {
        if(!inRect)
        {
            if(mSelectP->mType == WMLSelect::kCheckboxes)
                mIsSelected = !mIsSelected;
            else if(mSelectP->mType == WMLSelect::kRadioButtons)
                mSelectP->setSelected(mSelectP->getPreviousSelected());
```

105790" 10120860

```
        doDraw = true;
    }
    else
    {
        if(mSelectP->mType == WMLSelect::kRadioButtons)
        {
            WMLOption * lastOptionP = mSelectP->getPreviousSelected();

            if(lastOptionP && (lastOptionP != this))
            {
                lastOptionP->erase(sLastSelectionArea, Point::sZeroPoint());
                lastOptionP->draw(sLastSelectionArea, Point::sZeroPoint());
            }

            mSelectP->setPreviousSelected(NULL);
        }
    }
    }

    if(doDraw)
    {
        erase(displayArea, offset);
        draw(displayArea, offset);
    }

    return inRect;
}


void
WMLOption::erase(   const RectangleType & displayArea,
                    const Point &offset)
{
    RectangleType rect = displayArea;

    rect.topLeft.x -= offset.x - 1;
    rect.topLeft.y -= offset.y - 1;

    rect.extent.x = rect.extent.y = kCheckboxSize + 1;

    WinEraseRectangle(&rect, 0);
}



void
WMLOption::deselect()
{



CharPtr
WMLOption::getTitle()
{
    if(mTitle)
        return mTitle;
    else if(mValue)
        return mValue;
    else
        return "[Option]";
}


WMLButton::WMLButton(   BLGlyph * parent,
                        CharPtr text,
                        int     length,
                        TextState   state)
 :  WMLLineElement(parent)
 {
    mText = text;
    mLength = length;
    mState = state;
 }
```

```
void
WMLButton::draw(const RectangleType & displayArea,
                const Point &offset,
                bool invert)
{
    RectangleType rect = displayArea;

    TextState::enableBasicState();

    rect.topLeft.x -= offset.x - 1;
    rect.topLeft.y -= offset.y - 1;

    rect.extent = getExtent();

    rect.topLeft.y++;

    rect.extent.x -= 3;
    rect.extent.y -= 3;

    if(!invert)
        WinDrawRectangleFrame(roundFrame, &rect);
    else
        WinDrawRectangle(&rect, 4);

    if(!invert)
        WinDrawChars(mText, (Word) mLength, (SWord) rect.topLeft.x + 3, (SWord)
rect.topLeft.y + 1);
    else
        WinDrawInvertedChars(mText, (Word) mLength, (SWord) rect.topLeft.x + 3, (SWord)
rect.topLeft.y + 1);
}


bool
WMLButton::click(   const RectangleType & displayArea,
                    const Point &offset,
                    PointType p)
{
    RectangleType rect = WMLLineElement::getArea(displayArea, offset);
    Point pt(p);

    bool inRect = pt.isInside(rect);

    if(BLGlyph::sHiliteAction == kFindSelection)
    {
        if(inRect)
        {
            BLGlyph::sClickedAction = this;
            return true;
        }
        else
            return false;
    }
    else if(BLGlyph::sHiliteAction == kHilite)
    {
        if(inRect)
        {
            BLGlyph::sActiveRectVector.add(rect);

            draw(displayArea, offset, true);

            return true;
        }
        else return false;
    }
    else if(BLGlyph::sHiliteAction == kUnhilite)
    {
        if(BLGlyph::sClickedAction == this)
        {
            rect.extent = getExtent();
            WinEraseRectangle(&rect, 0);

            draw(displayArea, offset, false);
```

```
        }
    }

    return inRect;
}


Point
WMLButton::getExtent()
{
    Point extent;

    LineMetrics metrics = getMetrics();

    extent.x = metrics.width;
    extent.y = metrics.height();

    return extent;
}


Lir-Metrics
W       ton::getMetrics()
{
    LineMetrics metrics;

    metrics.baselineOffset = FntBaseLine() + 1;
    metrics.overhang = FntDescenderHeight() + 4;

    TextState state = TextState::getBasicState();
    metrics.width = WMLTextRun::getTextWidth(mText, mLength, state, metrics.height()) + 9;

    return metrics;
}


void
WMLButton::activate()
{
    if(mState.action)
        mState.action->activate();
}

// BLWMLInput.h

#pragma once

#include "BLGlyph.h"
#include "BLWMLActions.h"

c       WMLInput : public WMLLineElement, public virtual WMLAction
{
    public:

        enum InputType { kText, kPassword };

                                WMLInput();
                                WMLInput(BLGlyph * parent, const WMLInput& original);

        virtual void            draw(   const RectangleType & displayArea,
                                        const Point &offset);

        virtual void            computeMetrics(int lineWidth);

        virtual bool            click(  const RectangleType & displayArea,
                                        const Point &offset,
                                        PointType p);

        virtual Point           getExtent(const Point &areaExtent);

            LineMetrics         getMetrics();

                void            activate();

        friend  class           WBXMLParser;
```

```
    protected:

                bool            doInputDialog();
        static  Boolean         bookmarksAddHandleEvent(EventPtr eventP);

        CharPtr         mName;
        CharPtr         mValue;
        CharPtr         mAccessKey;
        CharPtr         mTitle;
        CharPtr         mFormat;
        int             mSize;
        int             mMaxLength;
        int             mTabIndex;
        InputType       mType;
        bool            mEmptytok;

        CharPtr         mTextEntered;
        int             mLineWidth;
};


class WMLFieldSet : public BLGlyph
{
    public:

                                WMLFieldSet();
                                WMLFieldSet(BLGlyph * parent, const WMLFieldSet& original);

                    CharPtr     getTitle() { return mTitle; }
                    int         getTitleLength() { if(mTitle != NULL) return (int)
StrLen(mTitle);
                                                                else   return 0; }

        friend  class           WBXMLParser;

    protected:

        CharPtr     mTitle;
};

class WMLOption;

class WMLSelect :   public WMLLineElement,
                    virtual public BLParentGlyph,
                    virtual public WMLAction

{
    public:

            enum SelectType { kRadioButtons, kCheckboxes, kPopupList, kScrollList };

                                WMLSelect();
                                WMLSelect(BLGlyph * parent, const WMLSelect& original);

        virtual bool            click(  const RectangleType & displayArea,
                                        const Point &offset,
                                        PointType p);

        virtual void            draw(   const RectangleType & displayArea,
                                        const Point &offset);

                void            setSelected(WMLOption * selectedP);
                void            setPreviousSelected(WMLOption * prevSelectedP)
                                { mPreviousSelectedP = prevSelectedP; }

                WMLOption * getSelected()
                                { return mSelectedP; }

                WMLOption * getPreviousSelected()
                                { return mPreviousSelectedP; }

                CharPtr     getTitle() { return mTitle; }
                int         getTitleLength() { if(mTitle != NULL) return (int)
StrLen(mTitle);
                                                                else   return 0; }
```

```
        virtual Point       getExtent(const Point &areaExtent);
        virtual Point       getExtent() { return getExtent(Point::sZeroPoint()); }

           LineMetrics      getMetrics();

              void          activate();

              // !!! Later, add kScrollList to this:
              bool          isDisplayable() { return    (mType == kPopupList); }

              void          incrementOptionCount() { mNumOptions++; }

        virtual void        computeMetrics(int lineWidth);

        friend  class       WBXMLParser;
        friend  class       WMLOption;

    protected:

        WMLOption * mSelectedP;
        WMLOption * mPreviousSelectedP;

        CharPtr     mTitle;
        CharPtr     mName;
        CharPtr     mValue;
        CharPtr     mIName;
        CharPtr     mIValue;
        int         mTabIndex;
        SelectType  mType;

        int         mNumOptions;
        int         mLineWidth;
};

class WMLOptgroup : public BLGlyph
{
    public:
                            WMLOptgroup();
                            WMLOptgroup(BLGlyph * parent, const WMLOptgroup& original);

        friend  class       WBXMLParser;

    protected:

        CharPtr     mTitle;
};

c     WMLOption :   public WMLLineElement,
                    virtual public BLParentGlyph,
                    virtual public WMLAction

{
    public:
                            WMLOption(WMLSelect * currSelectP);
                            WMLOption(BLGlyph * parent, const WMLOption& original);

        virtual void        draw(   const RectangleType & displayArea,
                                    const Point &offset);

        virtual bool        click(  const RectangleType & displayArea,
                                    const Point &offset,
                                    PointType p);

              void          deselect();

        virtual Point       getExtent(const Point &areaExtent);
        virtual Point       getExtent() { return getExtent(Point::sZeroPoint()); }

           LineMetrics      getMetrics();

              void          activate();
```

```
                    CharPtr     getValue() { return mValue; }
                    CharPtr     getTitle();
                    int         getTitleLength() { if(mTitle != NULL) return (int)
StrLen(mTitle);
                                                                 else  return 0; }

        friend  class   WBXMLParser;

    protected:
                void        erase(  const RectangleType & displayArea,
                                    const Point &offset);

        static      RectangleType   sLastSelectionArea;

        WMLSelect * mSelectP;

        CharPtr     mValue;
        CharPtr     mTitle;
        CharPtr     mOnPick;

        bool        mIsSelected;
};


class WMLButton :   public WMLLineElement,
                    virtual public WMLAction
{
    public:
                            WMLButton(  BLGlyph * parent,
                                        CharPtr text,
                                        int     length,
                                        TextState state);

        virtual LineMetrics getMetrics();

        virtual void        draw(   const RectangleType & displayArea,
                                    const Point &offset)
                                { draw(displayArea, offset, false); }

        virtual void        draw(   const RectangleType & displayArea,
                                    const Point &offset,
                                    bool invert);

        virtual bool        click(  const RectangleType & displayArea,
                                    const Point &offset,
                                    PointType p);

        virtual Point       getExtent();

                void        activate();

    protected:

                CharPtr     mText;
                int         mLength;
                TextState   mState;

};
// BLWMLSession.cpp

#include "BLWMLSession.h"
#include "BLUtils.h"
#include "BLPrefs.h"

const ULong kRenderIncrement = 2048;
const UInt kMaxPortStringSize = 8;
const int kDefaultPort = 80;
const int kChunkLengthBytes = 32;

extern Word AppNetRefnum;
```

```
BLWMLSession::BLWMLSession(BLNetworking * networkingP)
{
    mNetworkingP = networkingP;

    mCurrPage = -1;
    mLastPage = -1;
    mView = NULL;
    mDestCardID = NULL;
    mParserP = NULL;
    mIsDone = true;
    mPendingDownload = false;
    mDestURL = NULL;
    mContentLocation = NULL;

    mCurrImage = NULL;

    initializeSession();

    mCache.open();

    BLGlyph::setSession(this);

     astNavigationAction = kNone;
}


BLWMLSession::~BLWMLSession()
{
    mCache.closeRecords();
    mCache.close();
}


CharPtr
BLWMLSession::convertRelativeURL(CharPtr baseURL, CharPtr relativeURL)
{
    if(StrNCaselessCompare(relativeURL, "http://", StrLen("http://")) == 0)
    {
        return BLUtils::cloneString(relativeURL, 1);
    }

    int endPos = (int) StrLen(baseURL) - 1;

    int depth = 1;

    if(*relativeURL == '/')
    {
        relativeURL++;
        depth = 0;

     se

      while(1)
      {
          if((relativeURL[0] == '.') && (relativeURL[1] == '.') && (relativeURL[2] == '/'))
          {
              relativeURL += 3;
              depth++;
          }
          else if((relativeURL[0] == '.') && (relativeURL[1] == '.'))
          {
              relativeURL += 2;
              depth++;
              break;
          }
          else
          {
              break;
          }
      }
    }

    if((relativeURL[0] == '.') && (relativeURL[1] == '/'))
        relativeURL += 2;
```

```
    if(depth > 1)
    {
        // correct for bad ../ in URLs:
        // !!! imperfect, when / is not directory separator:
        int numSlashes = 0;
        int basePos = 0;

        while(baseURL[basePos] && (numSlashes < 3))
        {
            if(baseURL[basePos] == '/')
                numSlashes++;

            basePos++;
        }

        if(numSlashes < (depth + 3))
            depth = numSlashes - 3;

        if(depth < 0)
            depth = 0;
    }

    if(depth == 0)
    {
        endPos = (int) StrLen("http://");

        while(baseURL[endPos++] != '/')
        {
            if(baseURL[endPos] == '\0')
                break;
        }
    }
    else
    {
        if(baseURL[endPos] == '/')
        {
            if(depth > 1)
                endPos--;
            else
                depth = 0;
        }

        while(depth > 0)
        {
            do {
                endPos--;
            } while((endPos > 0) && (baseURL[endPos] != '/'));

            depth--;

            if(endPos == 0)
                break;
        }

        endPos++;
    }

    CharPtr newURL = new Char[endPos + StrLen(relativeURL) + 2];

    StrNCopy(newURL, baseURL, (UShort) endPos);
    StrCopy(newURL + endPos, relativeURL);

    return newURL;
}


void
BLWMLSession::verifyHTTPSlash(CharPtr url)
{
    UInt offset = 0;

    if(url[0] && (StrNCompare(url, "http://", StrLen("http://")) == 0))
        offset = StrLen("http://");

    if(StrStr(url + offset, "/") == NULL)
```

```
        StrCopy(url + StrLen(url), "/");
}


void
BLWMLSession::goTo(CharPtr url, bool isRelativeURL)
{
    if(StrLen(url) == 0)
        return;

    BLHistoryItem * item = NULL;

    CharPtr currPageURL = mContentLocation;

    if(currPageURL && currPageURL[0] == '\0')
        currPageURL = NULL;

    if((currPageURL == NULL) && (mCurrPage >= 0))
        currPageURL = mPageHistory.getElementAt(mCurrPage)->getURL();

    if(currPageURL == NULL)
        currPageURL = mNetworkingP->getContentLocation();

    if((url[0] == '#') && (url[1] != '\0'))
    {
        // we're going to another card on same page
        item = new BLHistoryItem(  BLUtils::cloneString(currPageURL),
                                   BLUtils::cloneString(&url[1]));
    }
    else
    {
        if(currPageURL && isRelativeURL)
            url = convertRelativeURL(currPageURL, url);
        else
            url = BLUtils::cloneString(url, 1);

        verifyHTTPSlash(url);

        CharPtr cardName = extractCardName(url);

        item = new BLHistoryItem(url, cardName);
    }

    if((mPageHistory.getNumElements() - 1) >= 0)
        for(int i = (mPageHistory.getNumElements() - 1); i >= (mCurrPage + 1); i--)
        {
            delete mPageHistory.remove(i);
            if(mLastPage > i)
                mLastPage--;
            else if(mLastPage == i)
                mLastPage = -1;
        }

    if(item != NULL)
    {
        addToHistory(item);

        loadPage(item);
    }
}


void
BLWMLSession::mailTo(char * /*url*/)
{
}


void
BLWMLSession::addToHistory(BLHistoryItem * item)
{
    mPageHistory.add(item);
    mCurrPage++;

    if((mPageHistory.getNumElements() > kHistorySize) && (mCurrPage != 0))
```

```
        BLHistoryItem * removedItem = mPageHistory.remove(0);
        delete removedItem;
        mCurrPage--;
        mLastPage--;
    }

    mLastNavigationAction = kGoTo;
}


void
BLWMLSession::goBack(void)
{
    if(mCurrPage <= 0)
        return;

    mLastNavigationAction = kGoBack;

    loadPage(mPageHistory.getElementAt(--mCurrPage));
}


void
BLWMLSession::goForward(void)
{
    if((mCurrPage + 1) >= mPageHistory.getNumElements())
        return;

    mLastNavigationAction = kGoForward;

    loadPage(mPageHistory.getElementAt(++mCurrPage));
}


void
BLWMLSession::goHome(void)
{
    // only add a new home page to vector if not at the home page
    if(mCurrPage >= 1)
        goTo(kDefaultPage, false);
}


void
BLWMLSession::refresh(bool onlyErase)
{
    if(mView)
    {
        if(onlyErase)
            mView->eraseView();
        else
            mView->newPage();

        mView->draw();
    }
}


CharPtr
BLWMLSession::skipHTTP(CharPtr url)
{
    if(StrNCompare(url, "http://", StrLen("http://")) == 0)
        return url + StrLen("http://");
    else
        return url;
}


void
BLWMLSession::loadPage(BLHistoryItem * item)
{
    CharPtr url = item->getURL();
    CharPtr cardID = item->getCardID();
```

```
    CharPtr currPageURL = NULL;

    if(mDestCardID != NULL)
    {
        delete [] mDestCardID;
        mDestCardID = NULL;
    }

    if((mLastPage >= 0) && (mLastPage < mPageHistory.getNumElements()))
    {
        BLHistoryItem * curPage = mPageHistory.getElementAt(mLastPage);
        if(curPage != NULL)
            currPageURL = curPage->getURL();
    }

    if( mParserP && (mParserP->getRoot() != NULL) &&
        currPageURL &&
        (StrCompare(skipHTTP(currPageURL), skipHTTP(url)) == 0))
    {
        CharPtr activeID = mParserP->getRoot()->getActiveCardID();

        if(activeID && cardID && (StrCompare(cardID, activeID) == 0))
        {
            mPageHistory.remove(mCurrPage);
            mCurrPage--;
            return;
        }
        else
        {
            if((cardID == NULL) && (activeID == NULL))
            {
                mPageHistory.remove(mCurrPage);
                mCurrPage--;
            }
            else if(mParserP->getRoot()->goToCard(cardID))
            {
                mView->newPage();
                mView->draw();
            }
            else
            {
                if(!mIsDone)
                    mDestCardID = BLUtils::cloneString(cardID);
                else
                    readFailure();
            }

            mLastPage = mCurrPage;

            return;
        }
    }

    mDestCardID = BLUtils::cloneString(cardID);

    mOldParserP = mParserP;
    mDownloadingImages = false;
    initiateDownload(BLUtils::cloneString(url));
}


/*
    returns port number from URL, also removes :port_num from
    URL string, if present.
*/

CharPtr
BLWMLSession::extractPortNumber(CharPtr url)
{
    UInt i = 0;
    UInt colonPos = 0;
    CharPtr portNumberString = new Char[kMaxPortStringSize];

    StrPrintF(portNumberString, "%i", kDefaultPort);
```

```
    while(true)
    {
        if(url[i] == '/')
            return portNumberString;
        else if(url[i] == ':')
        {
            colonPos = i;
            break;
        }
        else if(url[i] == '\0')
            return portNumberString;

        i++;
    }

    if(colonPos != 0)
    {
        i = colonPos + 1;

        while(BLUtils::isDigit(url[i]))
            i++;

        if(i == colonPos)
            return portNumberString;
        else if((i - colonPos) >= kMaxPortStringSize)
            i = colonPos + kMaxPortStringSize - 1;

        StrNCopy(portNumberString, &url[colonPos + 1], i-colonPos-1);

        MemMove(url + colonPos, url + i, StrLen(url + i) + 1);
    }

    return portNumberString;
}


CharPtr
BLWMLSession::extractCardName(CharPtr url)
{
    int pos = (int) StrLen(url);

    while((url[pos] != '/') && (pos >= 0))
    {
        if((url[pos] == '#') && (url[pos - 1] == '/'))
        {
            if(url[pos + 1])
            {
                CharPtr cardName = BLUtils::cloneString(&url[pos + 1]);

                url[pos] = '\0';

                return cardName;
            }
        }

        pos--;
    }

    return NULL;
}


bool
BLWMLSession::initiateDownload(CharPtr url)
{
    if(!BLPrefs::sPrefs.mShowImages && mDownloadingImages)
        return true;

    bool inCache = false;
    CharPtr originalURL = url;

    mNetworkingP->registerReader(this);

    while(*url && BLUtils::isWhitespace(*url))
        url++;
```

```
    if(!*url)
    {
        FrmCustomAlert(CustomAlert, "Malformed URL", "", "");

        if(mView)
            mView->draw();

        return false;
    }

    if(StrNCaselessCompare(url, "http://", StrLen("http://")) == 0)
        url += StrLen("http://");

    CharPtr portString = extractPortNumber(url);

    CharPtr fullURL = new Char[StrLen(kURLPrefix) + StrLen(portString) + StrLen(url) + 3];

    StrCopy(fullURL, kURLPrefix);
    StrCopy(fullURL + StrLen(fullURL), portString);
    UInt length = StrLen(fullURL);
    fullURL[length] = '/';
    StrCopy(fullURL + length + 1, url);

    delete [] portString;

    if(!mIsDone)
    {
        mNetworkingP->cancelOpenURL();
        mCache.closeRecords();
        mCacheEntry = NULL;
    }

    mIsDone = false;

    CharPtr entry;

    mBytesUsed = mCache.findRecord(originalURL, entry);

    if(mBytesUsed > 0)
    {
        mURLLength = StrLen(entry) + 1;

        CharPtr contentLoc = entry + mURLLength;

        mURLLength += StrLen(contentLoc) + 1;

        // word align:
        if((((ULong)entry + (ULong)mURLLength) % 2) != 0)
            mURLLength++;

        if(contentLoc[0] == '\0')
            contentLoc = NULL;

        if(mDownloadingImages)
        {
            mCurrImage->setImageData(entry + mURLLength);
            mIsDone = true;
        }
        else
        {
            delete [] mContentLocation;
            mContentLocation = BLUtils::cloneString(contentLoc);

            delete mParserP;
            BLGlyph::flushAll();
            mNetworkingP->clearTimer();

            mLastPage = mCurrPage;

            mOldParserP = mParserP = new WBXMLParser();

            if(mContentLocation == NULL)
                mContentLocation = BLUtils::cloneString(entry);
```

```
            mView->newPage();

            mCacheEntry = entry;

            ULong bytesUsed = kRenderIncrement;

            try
            {
                while(mParserP->readData(   entry + mURLLength,
                                            min(mBytesUsed - mURLLength, bytesUsed)) != 0)

                {
                    if(mView)
                    {
                        mView->setRoot(mParserP->getRoot());

                        if(mParserP->getRoot()->goToCard(mDestCardID))
                            mView->draw();
                    }

                    if(bytesUsed > (mBytesUsed - mURLLength))
                        break;

                    bytesUsed += kRenderIncrement;
                }

                if(mView)
                {
                    mView->setRoot(mParserP->getRoot());

                    if(mDestCardID != NULL)
                    {
                        if(mParserP->getRoot()->goToCard(mDestCardID))
                        {
                            mView->draw();
                        }
                        else
                        {
                            FrmAlert(DownloadErrorAlert);
                            mView->draw();
                        }
                    }
                    else
                        mView->draw();
                }
            }
            catch(OutOfMemoryException)
            {
                mPendingDownload = false;
                mIsDone = true;
                mDestURL = NULL;

                return false;
            }

            mPendingDownload = false;
            mIsDone = true;
            mDestURL = NULL;

            int numElements = mParserP->getImages().getNumElements();
            int pos = 0;
            bool downloadChosen = false;
            bool imageFound = false;

            // get images from cache, too, or download.
            for(int i=0; i<numElements; i++, pos++)
            {
                WMLImage * image = mParserP->getImages().getElementAt(pos);

                CharPtr entry;

                CharPtr url = convertRelativeURL(mContentLocation, image->getSrc());

                bytesUsed = mCache.findRecord(url, entry);

                if((bytesUsed == 0) && !downloadChosen)
```

```
            {
                mDownloadingImages = true;

                mCurrImage = mParserP->getImages().remove(pos--);

                if(mCurrImage != NULL)
                {
                    mOldParserP = NULL;
                    mContentLength = 0;
                    mBytesUsed = 0;
                    mChunkSize = 0;

                    initiateDownload(url);
                    downloadChosen = true;
                }
            }
            else if(bytesUsed > 0)
            {
                image = mParserP->getImages().remove(pos--);

                imageFound = true;

                int urlLength = (int) StrLen(entry) + 1;
                urlLength += (int) StrLen(entry + urlLength) + 1;

                // word align:
                if((((ULong)entry + (ULong)urlLength) % 2) != 0)
                    urlLength++;

                image->setImageData(entry + urlLength);
            }
        }

        if(imageFound && mView)
        {
            mView->erase();
            mView->draw();
        }

        if(mParserP->getRoot())
            mParserP->getRoot()->onEnterEvent(mLastNavigationAction);
    }

    inCache = true;
}
else
{
    mDestURL = originalURL;

    mPendingDownload = true;

    CharPtr networkErr;

    if((networkErr = mNetworkingP->openURL(fullURL, !mDownloadingImages)))
    {
        FrmCustomAlert(CustomAlert, networkErr, "", "");

        mPendingDownload = false;

        if(mView)
            mView->draw();
    }

    if(!mDownloadingImages)
        mParserP = NULL;

    inCache = false;
}

delete [] fullURL;

return inCache;
}
```

```
void
BLWMLSession::initializeSession()
{
    mCacheEntry = NULL;
    mBytesUsed = 0;
    mContentLength = 0;
    mChunkSize = 0;
    mDownloadingImages = false;

    if(mView)
        mView->setRoot(NULL);

    mOldParserP = NULL;
}


int
BLWMLSession::readChunkSize()
{
    int skipBytes = 0;
    Char sizeBuffer[kChunkLengthBytes];

    if(mChunkSize == 0)
    {
        int bytesRead = mNetworkingP->peek(sizeBuffer, kChunkLengthBytes);

        if(bytesRead > 0)
        {
            int i;

            for(i=0; BLUtils::isWhitespace(sizeBuffer[i]) || !sizeBuffer[i]; i++)
                if(i >= bytesRead)
                    break;

            if(i >= bytesRead)
            {
                mNetworkingP->readData(sizeBuffer, i);
                return 1;
            }

            skipBytes += i;

            mChunkSize = BLUtils::hexToInt(&sizeBuffer[skipBytes], skipBytes,
bytesRead-skipBytes);
            if(mChunkSize == -1)
            {
                mChunkSize = 0;
                return 1;
            }

            mContentLength += mChunkSize;
            skipBytes += 2; // for the \r\n
        }
    }

    if(skipBytes > 0)
        mNetworkingP->readData(sizeBuffer, skipBytes);

    return 0;
}


ULong
BLWMLSession::readData(CharPtr buffer, ULong length)
{
    BLNetworking::ContentType contentType = mNetworkingP->getContentType();

    if(mNetworkingP->getNetLibType() == BLNetworking::kINetLib && (length == 0))
        return 0;

    if(mOldParserP)
    {
        if(mParserP == mOldParserP)
            mParserP = NULL;
```

```
        delete mOldParserP;
        BLGlyph::flushAll();

        mCache.closeRecords();
        mNetworkingP->clearTimer();

        initializeSession();
    }

    if((contentType == BLNetworking::kWMLC) && mDownloadingImages)
        return 0;

    if((contentType == BLNetworking::kWMLC) && (mParserP == NULL))
    {
        mParserP = new WBXMLParser();

        if(mView)
            mView->newPage();
    }

    if((mPendingDownload || (mCacheEntry == NULL)) && mDestURL)
    {
        mCacheEntry = mCache.newRecord(mPageHistory, mCurrPage);

        // no more cache room.
        if(mCacheEntry == NULL)
            return 0;

        ErrNonFatalDisplayIf(mDestURL == NULL, "No Dest URL defined");

        mURLLength = StrLen(mDestURL) + 1;
        DmWrite(mCacheEntry, 0, mDestURL, mURLLength);

        CharPtr string;
        UInt length;

        CharPtr contentLoc = mNetworkingP->getContentLocation();

        if(contentLoc != NULL)
        {
            string = contentLoc;
            length = StrLen(string) + 1;
        }
        else
        {
            string = "";
            length = 1;
            contentLoc = mDestURL;
        }

        if(!mDownloadingImages)
        {
            delete [] mContentLocation;
            mContentLocation = BLUtils::cloneString(contentLoc);
        }

        DmWrite(mCacheEntry, mURLLength, string, length);

        mURLLength += length;

        // word align:
        if((((ULong)mCacheEntry + (ULong)mURLLength) % 2) != 0)
            mURLLength++;

        mPendingDownload = false;
    }
    else if(mDestURL == NULL)
        return 0;

    if(mCacheEntry == NULL)
        return 0;

    bool done = false;
    SWord bytesReceived;
```

```
    if(mNetworkingP->getNetLibType() == BLNetworking::kINetLib)
    {
        bytesReceived = (SWord) length;

        if(!mCache.growRecord((UShort)(mBytesUsed + mURLLength + length)))
            return 0;

        if(length > 0)
            DmWrite(mCacheEntry, mBytesUsed + mURLLength, buffer, length);
        else
            return 0;
    }
    else if(mNetworkingP->getNetLibType() == BLNetworking::kNetLib)
    {
        // headers are already parsed, we just need to read data directly
        // into a cache record:


        Word rcvLen = mCache.bytesLeft() - mURLLength;
        Err err = 0;

        if(rcvLen <= 0)
            return 0;
        if(mNetworkingP->getEncodingType() == HTTPRequest::kChunked)
        {
            if(readChunkSize() != 0)
                return 1;

            rcvLen = min(rcvLen, mChunkSize);
        }

        if(rcvLen > 0)
        {
            bytesReceived =
                NetLibDmReceive(AppNetRefnum,
                                mNetworkingP->getSock(),
                                mCacheEntry,
                                mBytesUsed + mURLLength,
                                rcvLen,
                                0,          // flags
                                NULL, NULL, // sender info
                                -1,
                                &err);

            mChunkSize -= bytesReceived;

            if(!mCache.growRecord((UShort)(mBytesUsed + mURLLength + bytesReceived)))
                return 0;

            if(err != 0)
                return 0;
        }
    }
    else
        return 0;

    if(bytesReceived > 0)
    {
        mBytesUsed += bytesReceived;

        if(contentType == BLNetworking::kWMLC)
        {
            mCurrImage = NULL;
            mLastPage = mCurrPage;

            try
            {
                if(mParserP->readData(mCacheEntry + mURLLength, mBytesUsed) == 0)
                {
                    done = true;
                    if(mNetworkingP->getEncodingType() == HTTPRequest::kChunked)
                    {
                        Char buffer[5];

                        // read final 0 length chunk header:
```

```
                readChunkSize();
                mNetworkingP->readData(buffer, 5);
            }
        }

        mView->setRoot(mParserP->getRoot());

        if(mDestCardID != NULL)
        {
            if(mParserP->getRoot()->goToCard(mDestCardID))
            {
                mView->draw();
                delete[] mDestCardID;
                mDestCardID = NULL;
            }
            else if(done)
            {
                FrmAlert(DownloadErrorAlert);
                mView->draw();
            }
        }
        else
            mView->draw();
    }
    catch(OutOfMemoryException e)
    {
        return 0;
    }
}
else if(contentType == BLNetworking::kPalmBitmap)
{   // !!! doesn't handle chunked
    if( (mBytesUsed >= mNetworkingP->getContentLength()) &&
        (mCurrImage != NULL))
    {
        done = true;

        mCacheEntry = mCache.checkInCurrent(true);

        mCurrImage->setImageData(mCacheEntry + mURLLength);

        if(mView)
        {
            mView->eraseView();
            mView->draw();
        }
    }
}
}
else

    done = true;
}

if(done)
{
    mIsDone = true;
    bytesReceived = 0;

    if(!mParserP)
        return 0;

    if(contentType == BLNetworking::kWMLC)
    {
        if(!mDownloadingImages)
        {
            mCache.checkInCurrent(false);
        }
        else
            mCache.removeCurrent();
    }

    bool gotImage = false;

    while(mParserP->getImages().getNumElements() > 0)
    {
```

```
            mDownloadingImages = true;

            mCurrImage = mParserP->getImages().remove(0);

            if(mCurrImage != NULL)
            {
                mOldParserP = NULL;
                CharPtr imageSource = mCurrImage->getSrc();

                if(mContentLocation && imageSource && mContentLocation[0] && imageSource[0])
                {
                    CharPtr url = convertRelativeURL(mContentLocation, imageSource);

                    mContentLength = 0;
                    mBytesUsed = 0;
                    mChunkSize = 0;

                    if(!initiateDownload(url))
                    {
                        if(gotImage)
                        {
                            if(mView)
                            {
                                mView->eraseView();
                                mView->draw();
                            }
                        }

                        return 1;
                    }
                    else
                    {
                        gotImage = true;
                    }
                }
            }
        }

        if(gotImage && mView)
        {
            mView->eraseView();
            mView->draw();
        }

        mDownloadingImages = false;
        mOldParserP = mParserP;

        if(mParserP->getRoot())
            mParserP->getRoot()->onEnterEvent(mLastNavigationAction);
    }

    return bytesReceived;
}


void
BLWMLSession::setTimer(ULong value, Timer * timerP)
{
    mNetworkingP->setTimer(value, timerP);
}


void
BLWMLSession::readFailure()
{
    if(!mDownloadingImages)
    {
        switch(mLastNavigationAction)
        {
            case kGoTo:
                delete mPageHistory.removeLast();
                mCurrPage--;
                break;

            case kGoBack:
```

```
            mCurrPage++;
            break;

          case kGoForward:
            mCurrPage--;
            break;
        }

        FrmAlert(DownloadErrorAlert);

        mView->draw();

        mParserP = mOldParserP;
        mOldParserP = NULL;

        mLastNavigationAction = kNone;
    }
}
// BLWMLSession.h

#pragma once

  :lude "BLURLHandler.h"
   clude "BLTypes.h"
#include "BLWMLView.h"
#include "BLVector.h"
#include "BLNetworking.h"
#include "BLCacheDB.h"
#include "WMLVariables.h"

class BLWMLSession : public BLURLHandler, public DataReader
{
    public:

                              BLWMLSession(BLNetworking * networkingP);
        virtual               ~BLWMLSession();

                void          setView(BLWMLView * view) { mView = view; }
                BLWMLView*    getView() { return mView; }

        virtual void          goTo(CharPtr url, bool isRelativeURL);
        virtual void          mailTo(char * url);
                void          goBack();
                void          goForward();
                void          goHome();
                void          refresh(bool onlyErase = false);

                bool          initiateDownload(CharPtr url);

        virtual ULong         readData(CharPtr buffer, ULong length);
        virtual void          readFailure();

        XMLParser *           getParser() { return mParserP; }

                void          addToHistory(BLHistoryItem * item);
                void          loadPage(BLHistoryItem * item);

                void          setTimer(ULong value, Timer * timerP);

                void          initializeSession();

                WMLVariables    * getVars() { return &mVars; }

    protected:

                CharPtr       skipHTTP(CharPtr url);

                CharPtr       convertRelativeURL(CharPtr baseURL, CharPtr relativeURL);
                void          verifyHTTPSlash(CharPtr url);

                CharPtr       extractPortNumber(CharPtr url);
                CharPtr       extractCardName(CharPtr url);

                int         readChunkSize();
```

```
                enum { kHistorySize = 20 };
                BLVector<BLHistoryItem *, kHistorySize> mPageHistory;

                BLWMLView * mView;
                int         mCurrPage;
                int         mLastPage;

                BLNetworking * mNetworkingP;
                WBXMLParser * mParserP;
                WBXMLParser * mOldParserP;

                WMLImage *  mCurrImage;

                WMLVariables    mVars;

                BLCacheDB   mCache;
                CharPtr     mContentLocation;
                CharPtr     mCacheEntry;
                CharPtr     mDestURL;
                CharPtr     mDestCardID;
                ULong       mBytesUsed;
                bool        mIsDone;
                UInt        mURLLength;
                int         mContentLength;
                int         mChunkSize;

                bool        mDownloadingImages;
                bool        mPendingDownload;

                NavigationAction    mLastNavigationAction;
};
// BLWMLTable.cpp

#include "BLWMLTable.h"

const int kMaxLogicalWidth = 32000;
const int kMaxLogicalHeight = 32000;
const int kMaxColumns = 30;
const int kMinColSpace = 5;


WMLTable::WMLTable()
{
    mNumColumns = 0;
    mAlignArray = NULL;
    mTitle = NULL;

    mAlignArrayLength = 0;
}


WMLTable::WMLTable(BLGlyph * parent, const WMLTable &original)
:   WMLLineElement(parent)
{
    mNumColumns = original.mNumColumns;
    mAlignArray = original.mAlignArray;
    mTitle = original.mTitle;

    if(mAlignArray)
        mAlignArrayLength = StrLen(mAlignArray);
    else
        mAlignArrayLength = 0;

    if((mNumColumns > 0) && (mNumColumns < kMaxColumns))
        mColWidths = (ColumnMetrics *) sMemManager.newChunk(
                    (sizeof(ColumnMetrics)) * mNumColumns);
    else
        mColWidths = NULL;
}


bool
WMLTable::flow(BLParentGlyph * parent, const Point &areaExtent)
{
```

```
    if(!computeColWidths(areaExtent.x))
        return false;

    if(mTitle)
    {
        TextState plainState;

        WMLLine * line = new WMLLine(parent, kCenter);

        WMLTextRun * run = new WMLTextRun( line,
                                            mTitle,
                                            (int) StrLen(mTitle),
                                            plainState);


        int tableWidth = 0;

        for(int i=0; i<mNumColumns; i++)
        {
            tableWidth += mColWidths[i].allocated;
        }

        run->computeMetrics(tableWidth);
        line->computeMetrics(tableWidth);
    }

    BLIterator<BLGlyph*, kChildrenInc> iter(*children());

    while(iter.hasNext())
    {
        // iterator over table rows:

        WMLTableRow * row = dynamic_cast<WMLTableRow *>(iter.getNext());
        parent->children()->add(row);
        BLIterator<BLGlyph*, kChildrenInc> rowIter(*row->children());

        int columnNum = 0;

        while(rowIter.hasNext())
        {
            // iterator over cells in row:

            WMLTableCell * cell = dynamic_cast<WMLTableCell *>(rowIter.getNext());

            if(columnNum < mAlignArrayLength)
            {
                switch(mAlignArray[columnNum])
                {
                    case 'L':
                    case 'D':
                        cell->setAlignment(kLeft);
                        break;
                    case 'C':
                        cell->setAlignment(kCenter);
                        break;
                    case 'R':
                        cell->setAlignment(kRight);
                        break;
                }
            }

            Point cellPoint(min(areaExtent.x, mColWidths[columnNum].allocated),
                            kMaxLogicalHeight);

            if(!cell->flow(cellPoint))
                return false;

            cell->computeMetrics(mColWidths[columnNum].allocated);

            columnNum++;

            if(columnNum == mNumColumns)
                columnNum--;
        }

        row->computeMetrics(areaExtent.x);
```

```
        return true;
}


bool
WMLTable::computeColWidths(int availableWidth)
{
    int columnNum;

    if(mColWidths == NULL)
        return false;

    for(int i=0; i<mNumColumns; i++)
    {
        mColWidths[i].min = 0;
        mColWidths[i].req = 0;
        mColWidths[i].allocated = 0;
    }

    BLIterator<BLGlyph*, kChildrenInc> iter(*children());

    while(iter.hasNext())
    {
        // iterator over table rows:

        BLGlyph * row = iter.getNext();
        if(dynamic_cast<WMLTableRow *>(row) == NULL)
        {
            // badly formed table...
            return false;
        }

        BLIterator<BLGlyph*, kChildrenInc> rowIter(*row->children());
        columnNum = 0;

        while(rowIter.hasNext())
        {
            // iterator over cells in row:

            WMLTableCell * cell = dynamic_cast<WMLTableCell *>(rowIter.getNext());
            if(cell == NULL)
            {
                // badly formed table...
                return false;
            }

            cell->computeWidth();

            mColWidths[columnNum].setMin(cell->mMinWidth);
            mColWidths[columnNum].setReq(cell->mReqWidth);

            columnNum++;
            if(columnNum == mNumColumns)
                columnNum--;
        }
    }

    int leftOver = availableWidth;
    int totalGap = 0;

    for(int i=0; i<mNumColumns; i++)
    {
        mColWidths[i].allocated = mColWidths[i].min;
        leftOver -= mColWidths[i].allocated;
        totalGap += mColWidths[i].req - mColWidths[i].min;
    }

    if((leftOver > 0) && (totalGap > 0))
    {
        for(int i=0; i<mNumColumns; i++)
        {
            mColWidths[i].allocated += (leftOver*(100*(mColWidths[i].req - mColWidths[i].min)
/ totalGap)) / 100;
```

```
        }
    }

    BLIterator<BLGlyph*, kChildrenInc> iter2(*children());

    // set widths for table cells
    while(iter2.hasNext())
    {
        // iterator over table rows:

        BLGlyph * row = iter2.getNext();

        BLIterator<BLGlyph*, kChildrenInc> rowIter(*row->children());
        columnNum = 0;

        while(rowIter.hasNext())
        {
            // iterator over cells in row:

            WMLTableCell * cell = dynamic_cast<WMLTableCell *>(rowIter.getNext());

            LineMetrics metrics = cell->getMetrics();

            metrics.width = mColWidths[columnNum].allocated;
            cell->setMetrics(metrics);

            columnNum++;
            if(columnNum == mNumColumns)
                columnNum--;
        }
    }

    return true;
}

void
WMLTable::draw(const RectangleType & /*displayArea*/, const Point &/*offset*/)
{
}

void
WMLTable::computeMetrics(int /*lineWidth*/)
{
}


WMLTableRow::WMLTableRow(BLGlyph * parent)
:   WMLLine(parent, kLeft)



WMLTableCell::WMLTableCell(BLGlyph * parent)
:   WMLLineElement(), WMLParagraph(parent, WMLParagraph())
{
    mMinWidth = 0;
    mReqWidth = 0;
}


void
WMLTableCell::computeMetrics(int /*lineWidth*/)
{
    mMetrics.baselineOffset = 0;
    mMetrics.overhang = getExtent().y;
}


void
WMLTableCell::computeWidth()
{
    BLIteratorNode<BLGlyph*, kChildrenInc> * curIter;
    BLIteratorNode<BLGlyph*, kChildrenInc> * iter;
```

```
    iter = new BLIteratorNode<BLGlyph*, kChildrenInc>(mChildren);
    BLStack iterStack;
    iterStack.push(iter);

    while(iterStack.top() != NULL)
    {
        curIter = (BLIteratorNode<BLGlyph*, kChildrenInc> *) iterStack.pop();

        while(curIter->hasNext())
        {
            BLGlyph * elem = curIter->getNext();

            if(elem->children())
            {
                iter = new BLIteratorNode<BLGlyph*, kChildrenInc> (*elem->children());

                if(curIter->hasNext())
                {
                    iterStack.push(curIter);
                    curIter = NULL; // make it NULL so it won't be deleted
                }

                iterStack.push(iter);
                break;
            }
            else
            {
                if(dynamic_cast<WMLTextRun *>(elem) != NULL)
                {
                    WMLTextRun * textRun = dynamic_cast<WMLTextRun *>(elem);
                    TextState state = textRun->getState();
                    state.enable();
                    textRun->computeMetrics(kMaxLogicalWidth);
                    setReqWidth(textRun->getMetrics().width);

                    if(state.bits.wordWrap)
                        setMinWidth(textRun->findLongestWord());
                    else
                        setMinWidth(textRun->getMetrics().width);
                }
                else if(dynamic_cast<WMLImage *>(elem) != NULL)
                {
                    WMLImage * image = dynamic_cast<WMLImage *>(elem);
                    Point extent = image->getExtent();
                    mReqWidth += extent.x;

                    setMinWidth(extent.x);
                }
            }
        }

        delete curIter;
    }
}



// BLWMLTable.h

#include "BLGlyph.h"

struct ColumnMetrics
{
    int min;
    int req;
    int allocated;

    void setMin(int newMin) { min = max(newMin, min); }
    void setReq(int newReq) { req = max(newReq, req); }
};

class WMLTable : public WMLLineElement
```

```
{
   public:
                              WMLTable();
                              WMLTable(BLGlyph * parent, const WMLTable &original);

      virtual bool            flow(BLParentGlyph * parent, const Point &areaExtent);
      virtual void            draw(const RectangleType & displayArea, const Point &offset);
      virtual void            computeMetrics(int lineWidth);
      virtual      Point      getExtent() { return Point::sZeroPoint(); }
      virtual      Point      getExtent(const Point &/*areaExtent*/)
                              { return Point::sZeroPoint(); }

      virtual BLVector<BLGlyph*, kChildrenInc> * children()
              { return &mChildren; }

      virtual LineMetrics getMetrics() { return mMetrics; }
      virtual void            setMetrics(const LineMetrics &metrics) { mMetrics = metrics; }

      friend  class           WBXMLParser;

  ~rotected:

            BLVector<BLGlyph*, kChildrenInc>    mChildren;

            bool         computeColWidths(int availableWidth);

            int                 mNumColumns;
            ColumnMetrics *     mColWidths;
            int                 mTotalWidth;

            CharPtr             mTitle;
            CharPtr             mAlignArray;
            UInt                mAlignArrayLength;


            LineMetrics     mMetrics;
};


class WMLTableRow : public WMLLine
{
   public:
                              WMLTableRow(BLGlyph * parent);

       virtual void           draw(const RectangleType & displayArea, const Point &offset)
                              { WMLLine::draw(displayArea, offset); }
};

// ..I you really want a virtual base class, right?
class WMLTableCell : public WMLParagraph, virtual public WMLLineElement
{
   public:
                              WMLTableCell(BLGlyph * parent);

                    void      computeWidth();

        virtual     void      computeMetrics(int lineWidth);

        virtual     Point     getExtent() { return WMLParagraph::getExtent(); }
        virtual     Point     getExtent(const Point &areaExtent)
                              { return WMLParagraph::getExtent(areaExtent); }

        virtual     void      draw(const RectangleType & displayArea, const Point &offset)
                              { return WMLParagraph::draw(displayArea, offset); }

        virtual     bool      click(  const RectangleType & displayArea,
                                      const Point &offset,
                                      PointType p)
                              { return WMLParagraph::click(displayArea, offset, p); }

                    void      setAlignment(Alignment align) { mAlign = align; }
```

```
            virtual LineMetrics getMetrics() { return mMetrics; }
            virtual void        setMetrics(const LineMetrics &metrics) { mMetrics = metrics; }

                      int      mMinWidth;
                      int      mReqWidth;

      protected:

                      void     setMinWidth(int newMin) { mMinWidth = max(mMinWidth, newMin); }
                      void     setReqWidth(int newMin) { mReqWidth = max(mReqWidth, newMin); }


            LineMetrics      mMetrics;

};
// BLWMLView.cpp

#include "BLWMLView.h"
#include "BLIterator.h"
#include "BLUtils.h"
#include "BLWMLSession.h"
#include "BLWMLActions.h"
#include "BLWMLForm.h"

const int kLineSize = 11;
const int kColumnSize = 11;
const int kScrollbarHeight = 7;


BLWMLView::BLWMLView(   BLWMLForm *       formP,
                        BLWMLSession *    urlHandler,
                        RectangleType     rect,
                        UInt              vScrollBarID,
                        UInt              hScrollBarID)

  :   mRootExtent(0, 0)
  {
      mFormP =         formP;

      mParser =        NULL;
      mURLHandler =    urlHandler;
      mRect =          rect;
      mVScrollBarID = vScrollBarID;
      mHScrollBarID = hScrollBarID;

      mVScrollBarP = (ScrollBarPtr) BLUtils::getObjectPtr(mVScrollBarID);
      mHScrollBarP = (ScrollBarPtr) BLUtils::getObjectPtr(mHScrollBarID);

      mIsMoving = false;
      mIsMouseInView = false;

      initPage();

      mRoot = NULL;
  }


  BLWMLView::~BLWMLView()
  {
      BLGlyph::flushAll();

      delete mParser;
  }


  void
  BLWMLView::open()
  {
      mURLHandler->goTo(kDefaultPage, NULL);
  }


  void
  BLWMLView::scrollBarEvent(void * pScrollBar)
  {
      if(pScrollBar == mVScrollBarP)
```

```
    {
        if(mVScrollBarP->attr.activeRegion == sclDownArrow)
            scrollVert(kLineSize - 1);
        else if(mVScrollBarP->attr.activeRegion == sclUpArrow)
            scrollVert(-(kLineSize - 1));
        else
            draw();
    }
    else if(pScrollBar == mHScrollBarP)
    {
        if(mHScrollBarP->attr.activeRegion == sclDownArrow)
            scrollHoriz(kColumnSize - 1);
        else if(mHScrollBarP->attr.activeRegion == sclUpArrow)
            scrollHoriz(-(kColumnSize - 1));
        else
            draw();
    }
}


void
BLWMLView::scrollHoriz(int scrollPixels)
{
    Short hValue, newHValue;

    Short min, max, pageSize;

    SclGetScrollBar(mHScrollBarP, &hValue, &min, &max, &pageSize);

    newHValue = hValue + scrollPixels;

    if(newHValue < min)
        newHValue = min;

    if(newHValue > max)
        newHValue = max;

    if(newHValue != hValue)
    {
        SclSetScrollBar(mHScrollBarP, newHValue, min, max, pageSize);
        draw();
    }
}


void
BLWMLView::scrollVert(int scrollPixels)
{
    Short vValue, newVValue;

    Short min, max, pageSize;

    SclGetScrollBar(mVScrollBarP, &vValue, &min, &max, &pageSize);

    newVValue = vValue + scrollPixels;

    if(newVValue < min)
        newVValue = min;

    if(newVValue > max)
        newVValue = max;

    if(newVValue != vValue)
    {
        SclSetScrollBar(mVScrollBarP, newVValue, min, max, pageSize);
        draw();
    }
}


Boolean
BLWMLView::handleEvent(EventPtr eventP)
{
    Boolean handled = false;
```

```
    Short min, max, pageSize;
    Short vValue, hValue;

    Point mousePoint;
    Point offset;

    switch(eventP->eType)
    {
        case sclRepeatEvent:
            scrollBarEvent(eventP->data.sclRepeat.pScrollBar);
            break;

        case menuEvent:
            break;

        case penMoveEvent:
            mousePoint = Point(eventP->screenX, eventP->screenY);

            if(BLGlyph::sClickedAction != NULL)
            {
                if(!BLUtils::isInsideRectVector(mousePoint, BLGlyph::sActiveRectVector))
                {
                    // (un)hilite link
                    BLGlyph::sHiliteAction = BLGlyph::kUnhilite;

                    SclGetScrollBar(mHScrollBarP, &hValue, &min, &max, &pageSize);
                    SclGetScrollBar(mVScrollBarP, &vValue, &min, &max, &pageSize);

                    offset = Point( (SWord) hValue,
                                    (SWord) vValue);

                    WinSetClip(&mRect);
                    mRoot->click(mRect, offset, mousePoint);
                    WinResetClip();

                    BLGlyph::sClickedAction = NULL;
                    BLGlyph::sActiveRectVector.removeAll();

                    mPenDownPoint.x = mousePoint.x;
                    mPenDownPoint.y = mousePoint.y;
                }
            }

            if((BLGlyph::sClickedAction == NULL) && mIsMouseInView)
            {
                bool redraw = false;
                Point scrollPixels(-(mousePoint.x - mPenDownPoint.x),
                                   -(mousePoint.y - mPenDownPoint.y));

                if(mIsHorizShowing)
                {   // Horizontal:
                    if(!mIsMoving)
                    {
                        mPixelsMoved.x += scrollPixels.x;
                        if(BLUtils::abs(mPixelsMoved.x) > kColumnSize/2)
                        {
                            scrollPixels.x = mPixelsMoved.x;
                            mIsMoving = true;
                        }
                        else
                            scrollPixels.x = 0;
                    }

                    if((scrollPixels.x != 0) &&
                       (BLUtils::abs(3*scrollPixels.x) > BLUtils::abs(scrollPixels.y)))
                    {
                        scrollHoriz(scrollPixels.x);
                    }
                }

                if(mIsVertShowing)
                {   // Vertical:
                    if(!mIsMoving)
                    {
```

```
            mPixelsMoved.y += scrollPixels.y;
            if(BLUtils::abs(mPixelsMoved.y) > kLineSize/2)
            {
                scrollPixels.y = mPixelsMoved.y;
                mIsMoving = true;
            }
            else
                scrollPixels.y = 0;
        }

        if((scrollPixels.y != 0) &&
            (BLUtils::abs(3*scrollPixels.y) > BLUtils::abs(scrollPixels.x)))
        {
            scrollVert(scrollPixels.y);
        }
    }

    mPenDownPoint = mousePoint;
}

handled = true;
break;

case penDownEvent:
    mousePoint = Point(eventP->screenX, eventP->screenY);

    if(mRoot == NULL)
        break;

    if(mousePoint.isInside(mRect))
    {
        mIsMouseInView = true;

        mPenDownPoint = Point(eventP->screenX, eventP->screenY);

        SclGetScrollBar(mHScrollBarP, &hValue, &min, &max, &pageSize);
        SclGetScrollBar(mVScrollBarP, &vValue, &min, &max, &pageSize);

        offset = Point( (SWord) hValue,
                        (SWord) vValue);


        WinSetClip(&mRect);

        // first pass: find clicked link
        BLGlyph::sHiliteAction = BLGlyph::kFindSelection;
        mRoot->click(mRect, offset, mousePoint);

        // hilite link
        BLGlyph::sHiliteAction = BLGlyph::kHilite;
        mRoot->click(mRect, offset, mousePoint);

        WinResetClip();

        handled = true;
    }
    break;

case penUpEvent:
    mousePoint = Point(eventP->screenX, eventP->screenY);
    mIsMouseInView = false;

    if(BLGlyph::sClickedAction != NULL)
    {
        // (un)hilite link

        SclGetScrollBar(mHScrollBarP, &hValue, &min, &max, &pageSize);
        SclGetScrollBar(mVScrollBarP, &vValue, &min, &max, &pageSize);

        offset = Point( (SWord) hValue,
                        (SWord) vValue);

        WinSetClip(&mRect);

        BLGlyph::sHiliteAction = BLGlyph::kUnhilite;
```

```
            mRoot->click(mRect, offset, mousePoint);

            BLGlyph::sClickedAction->activate();
            BLGlyph::sClickedAction = NULL;
            BLGlyph::sActiveRectVector.removeAll();

            WinResetClip();

            handled = true;
        }
        else
        {
            mIsMoving = false;
            mPixelsMoved = Point(0, 0);
        }
        break;

    case keyDownEvent:
        if(eventP->data.keyDown.chr == pageDownChr)
        {
            SclGetScrollBar(mVScrollBarP, &vValue, &min, &max, &pageSize);

            if(vValue < max)
            {
                vValue += pageSize - kLineSize;
                if(vValue > max)
                    vValue = max;

                SclSetScrollBar(mVScrollBarP, vValue, min, max, pageSize);
                draw();
            }

            handled = true;
        }
        else if(eventP->data.keyDown.chr == pageUpChr)
        {
            SclGetScrollBar(mVScrollBarP, &vValue, &min, &max, &pageSize);

            if(vValue > min)
            {
                vValue -= pageSize - kLineSize;
                if(vValue < min)
                    vValue = min;

                SclSetScrollBar(mVScrollBarP, vValue, min, max, pageSize);
                draw();
            }

            handled = true;
        }
        break;
    }

    return handled;
}


RectangleType
BLWMLView::getBounds()
{
    // !!! oops...won't be correct if horiz scrollbar present...
    return mRect;
}


void
BLWMLView::draw()
{
    if(mRoot == NULL)
        return;

    Short vValue, hValue, unused;

    FormPtr activeFormP = FrmGetActiveForm();
```

```
    SclGetScrollBar(mVScrollBarP, &vValue, &unused, &unused, &unused);
    SclGetScrollBar(mHScrollBarP, &hValue, &unused, &unused, &unused);

    Point offset(   (SWord) hValue,
                    (SWord) vValue);

    RectangleType displayRect = mRect;

    Point rectOffset(   hValue - mLastHScrollValue,
                        vValue - mLastVScrollValue);

    if((rectOffset.x != 0) || (rectOffset.y != 0))
    {
        DirectionType vDirection;
        DirectionType hDirection;
        RectangleType srcRect = mRect;

        // verticle scroll:
        if(rectOffset.y > 0)
        {
            if(rectOffset.y < mRect.extent.y)
            {
                displayRect.topLeft.y += rectOffset.y;
                displayRect.extent.y -= rectOffset.y;

                vDirection = up;

                offset.y += displayRect.extent.y;
            }
        }
        else if(rectOffset.y < 0)
        {
            rectOffset.y = -rectOffset.y;

            if(rectOffset.y < mRect.extent.y)
            {
                displayRect.extent.y = rectOffset.y;

                vDirection = down;
            }
        }

        // horiz scroll:
        if(rectOffset.x > 0)
        {
            if(rectOffset.x < mRect.extent.x)
            {
                displayRect.topLeft.x += rectOffset.x;
                displayRect.extent.x -= rectOffset.x;

                hDirection = left;

                offset.x += displayRect.extent.x;
            }
        }
        else if(rectOffset.x < 0)
        {
            rectOffset.x = -rectOffset.x;

            if(rectOffset.x < mRect.extent.x)
            {
                displayRect.extent.x = rectOffset.x;

                hDirection = right;
            }
        }

        if((rectOffset.y < mRect.extent.y) && (rectOffset.x < mRect.extent.x))
        {
            if(rectOffset.y > 0)
                WinScrollRectangle(&srcRect, vDirection, rectOffset.y, &displayRect);

            if(rectOffset.x > 0)
                WinScrollRectangle(&srcRect, hDirection, rectOffset.x, &displayRect);
```

```
            }
            WinEraseRectangle(&displayRect, 0);
        }

        Point extent;

        try
        {
            WinSetClip(&mRect);

            mRoot->draw(displayRect, offset);

            WinResetClip();

            extent = mRoot->getExtent(mRect.extent);
        }
        catch(OutOfMemoryException e)
        {
            WinResetClip();

            goto DRAW_END;
        }

        if(mRootExtent != extent)
        {
            mRootExtent = extent;

            if(extent.x > displayRect.extent.x)
            {
                if(!mIsHorizShowing)
                {
                    mRect.extent.y -= kScrollbarHeight;
                    mIsHorizShowing = true;

                    RectangleType bounds;

                    FrmGetObjectBounds(activeFormP, FrmGetObjectIndex(activeFormP,
mHScrollBarID), &bounds);

                    WinEraseRectangle(&bounds, 0);
                    FrmShowObject(activeFormP, FrmGetObjectIndex(activeFormP, mHScrollBarID));
                }

                int pageMax = extent.x - mRect.extent.x;

                if(pageMax < 0)
                    pageMax = 0;

                SclSetScrollBar(mHScrollBarP, hValue, 0,
                                pageMax,
                                mRect.extent.x);
            }

            if(extent.y > displayRect.extent.y)
            {
                if(!mIsVertShowing)
                {
                    FrmShowObject(activeFormP, FrmGetObjectIndex(activeFormP, mVScrollBarID));
                    mIsVertShowing = true;
                }

                int pageMax = extent.y - mRect.extent.y;

                if(pageMax < 0)
                    pageMax = 0;

                SclSetScrollBar(mVScrollBarP, vValue, 0,
                                pageMax,
                                mRect.extent.y);
            }
        }

    DRAW_END:
```

```
    TextState::enableBasicState();

    mLastVScrollValue = vValue;
    mLastHScrollValue = hValue;
}


void
BLWMLView::newPage()
{
    FormPtr activeFormP = FrmGetActiveForm();

    WinResetClip();

    if(mIsHorizShowing)
    {
        mRect.extent.y += kScrollbarHeight;

        FrmHideObject(activeFormP, FrmGetObjectIndex(activeFormP, mHScrollBarID));
    }

    if(mIsVertShowing)
    {
        FrmHideObject(activeFormP, FrmGetObjectIndex(activeFormP, mVScrollBarID));
    }

    initPage();

    mRootExtent = Point::sZeroPoint();

    eraseView();
}


void
BLWMLView::eraseView()
{
    WinEraseRectangle(&mRect, 0);
}


void
BLWMLView::initPage()
{
    SclSetScrollBar((ScrollBarPtr) BLUtils::getObjectPtr(mVScrollBarID), 0, 0, 0, 0);
    SclSetScrollBar((ScrollBarPtr) BLUtils::getObjectPtr(mHScrollBarID), 0, 0, 0, 0);

    mLastHScrollValue = 0;
    mLastVScrollValue = 0;

    mIsHorizShowing = false;
    mIsVertShowing = false;

    BLGlyph::sClickedAction = NULL;
    BLGlyph::sActiveRectVector.removeAll();
}


void
BLWMLView::refreshFormPointer()
{
    mFormP->refreshFormPointer();

    mVScrollBarP = (ScrollBarPtr) BLUtils::getObjectPtr(mVScrollBarID);
    mHScrollBarP = (ScrollBarPtr) BLUtils::getObjectPtr(mHScrollBarID);
}

// BLWMLView.h

#pragma once

#include "BLView.h"
#include "WBXMLParser.h"
#include "BLURLHandler.h"
#include "BLGlyph.h"
```

```
#include "BLTypes.h"
#include "BLPagesDB.h"

class BLWMLSession;
class BLWMLForm;

class BLWMLView : public BLView
{
    public:
                            BLWMLView(  BLWMLForm *      formP,
                                        BLWMLSession *   urlHandler,
                                        RectangleType    rect,
                                        UInt             vScrollBarID,
                                        UInt             hScrollBarID);

        virtual                         ~BLWMLView();

        virtual void                    open();

        virtual Boolean                 handleEvent(EventPtr eventP);

        virtual RectangleType           getBounds();

        virtual void                    draw();

                void                    newPage();

                void                    initPage();

                void                    setRoot(WMLRoot * root) { mRoot = root; }

                void                    eraseView();

                void                    refreshFormPointer();

    protected:
                void                    scrollBarEvent(void * pScrollBar);
                void                    scrollVert(int scrollPixels);
                void                    scrollHoriz(int scrollPixels);

                Short                   mLastHScrollValue;
                Short                   mLastVScrollValue;

                BLWMLForm *             mFormP;

                WBXMLParser *           mParser;
                WMLRoot *               mRoot;

                BLWMLSession *          mURLHandler;
                RectangleType           mRect;
                UInt                    mVScrollBarID;
                UInt                    mHScrollBarID;
                ScrollBarPtr            mVScrollBarP;
                ScrollBarPtr            mHScrollBarP;

                Point                   mRootExtent;

                bool                    mIsHorizShowing;
                bool                    mIsVertShowing;

                Point                   mExtraPixels;
                Point                   mPenDownPoint;
                Point                   mPixelsMoved;
                bool                    mIsMoving;
                bool                    mIsMouseInView;
};// BLXMLForm.cpp

#include "BLXMLForm.h"

BLXMLForm::BLXMLForm(   UInt    supportedFormID,
                        UInt    viewGadgetID,
                        UInt    scrollBarID)
```

```
:   BLForm(supportedFormID)
{
    BLXMLView   xmlView = new(BLXMLView(BLURLHandler *      urlHandler,
                                        RectanglePtr    rect,
                                        CharPtr         xmlData,
                                        int             dataLength,
                                        ScrollBarPtr    scrollBar));


    addView(xmlView);
}


BLXMLForm::~BLXMLForm()
{
}


void
BLXMLForm::formLoad(FormPtr formP)
{
    BLForm::formLoad(formP);
}


void
BLXMLForm::formOpen()
{
}


void
BLXMLForm::formClose()
{
}


Boolean
BLXMLForm::handleEvent(EventPtr eventP)
{
}


// BLXMLParser.cpp

#include "BLXMLParser.h"
#include "BLIterator.h"


XMLAttribute::XMLAttribute(const XML_Char * name,
                           const XML_Char * value)

{
    mName = (XML_Char *) XMLElement::sMemManager.newChunk(strlen(name) + 1);
    strcpy(mName, name);

    mValue = (XML_Char *) XMLElement::sMemManager.newChunk(strlen(value) + 1);
    strcpy(mValue, value);
}


BLMemoryManager
XMLElement::sMemManager;

XMLElement::XMLElement( XMLElement *     parent,
                        const XML_Char * name)
:   mAttributes(kAttrInc),
    mChildren(kChildrenInc)
{
    mParent = parent;

    if(name)
    {
        mName = (XML_Char *) sMemManager.newChunk(strlen(name) + 1);
        strcpy(mName, name);
    }
    else
```

```
        mName = NULL;
}


void
XMLElement::addAttribute(   const XML_Char * name,
                            const XML_Char * value)

{
    mAttributes.add(XMLAttribute(name, value));
}


CharPtr
XMLElement::getAttributeValue(CharPtr attrName, CharPtr defaultValue)
{
    BLIterator<XMLAttribute, XMLElement::kAttrInc> iter(mAttributes);

    while(iter.hasNext())
    {
        XMLAttribute * attr = &iter.getNext();

        if(StrCompare(attr->mName, attrName) == 0)
        {
            return attr->mValue;
        }
    }

    return defaultValue;
}


void *
XMLElement::operator new(size_t size)
{
    return sMemManager.newChunk(size);
}


void
XMLElement::operator delete(void *, size_t)
{
}


XMLTextNode::XMLTextNode(   XMLElement *     parent,
                            const XML_Char * data,
                            int              len)

:   XMLElement(parent, NULL)
{
    mText = (XML_Char *) sMemManager.newChunk(len + 2); // +2, one for terminator one for
possible whitespace
    mLength = len;

    MemMove(mText, data, len);
    mText[mLength] = '\0';
}


BLXMLParser::BLXMLParser(RawPageData * rawPage)
{
    if(rawPage != NULL)
    {
        mFile = rawPage->mData;
        mFileLength = rawPage->mLength;
        mCachedPage = true;
    }
    else
    {
        mCachedPage = false;
    }

    mRoot = NULL;
    mParser = XML_ParserCreate(NULL);
```

```
    XML_SetUserData(mParser, this);

    XML_SetElementHandler( mParser,
                           sStartElementHandler,
                           sEndElementHandler );


    XML_SetCharacterDataHandler(mParser,
                                sCharacterDataHandler);
}


BLXMLParser::~BLXMLParser()
{
    XML_ParserFree(mParser);
}


XMLElement *
BLXMLParser::parse()
{
    BLVector<XMLElement *,
XMLElement::kChildrenInc>::setMemManager(&XMLElement::sMemManager);
    BLVector<XMLAttribute, XMLElement::kAttrInc>::setMemManager(&XMLElement::sMemManager);

    if((mFile == NULL) || (mFileLength == 0))
        return NULL;

    int error = 1;

    if(mCachedPage)
        error = XML_Parse(mParser, mFile, (int) mFileLength, true);

    if (error == 0)
    {
        ErrDisplay(reportError());
        return NULL;
    }
    else return mRoot;
}


void
BLXMLParser::read(char * buffer, ULong length)
{
    int error = XML_Parse(mParser, buffer, (int) length, false);

    if (error == 0)
    {
        ErrDisplay(reportError());
    }
}


char *
BLXMLParser::reportError()
{
    XML_Error   error = XML_GetErrorCode(mParser);
    char *      message;

    switch (error) {
        case XML_ERROR_NONE:
            message = "None";
            break;
        case XML_ERROR_NO_MEMORY:
            message = "No Memory";
            break;
        case XML_ERROR_SYNTAX:
            message = "Syntax Error";
            break;
        case XML_ERROR_NO_ELEMENTS:
            message = "No Elements";
            break;
        case XML_ERROR_INVALID_TOKEN:
            message = "Invalid Token";
            break;
```

```
        case XML_ERROR_UNCLOSED_TOKEN:
            message = "Unclosed Token";
            break;
        case XML_ERROR_PARTIAL_CHAR:
            message = "Partial Char";
            break;
        case XML_ERROR_TAG_MISMATCH:
            message = "Tag Mismatch";
            break;
        case XML_ERROR_DUPLICATE_ATTRIBUTE:
            message = "Duplicate Attribute";
            break;
        case XML_ERROR_JUNK_AFTER_DOC_ELEMENT:
            message = "Junk After Doc Element";
            break;
        case XML_ERROR_PARAM_ENTITY_REF:
            message = "Param Entity Ref";
            break;
        case XML_ERROR_UNDEFINED_ENTITY:
            message = "Undefined Entity";
            break;
        case XML_ERROR_RECURSIVE_ENTITY_REF:
            message = "Recursive Entity Ref";
            break;
        case XML_ERROR_ASYNC_ENTITY:
            message = "Async Entity";
            break;
        case XML_ERROR_BAD_CHAR_REF:
            message = "Bad Char Ref";
            break;
        case XML_ERROR_BINARY_ENTITY_REF:
            message = "Binary Entity Ref";
            break;
        case XML_ERROR_ATTRIBUTE_EXTERNAL_ENTITY_REF:
            message = "Attribute External Entity Ref";
            break;
        case XML_ERROR_MISPLACED_XML_PI:
            message = "Misplaced XML PI";
            break;
        case XML_ERROR_UNKNOWN_ENCODING:
            message = "Unknown Encoding";
            break;
        case XML_ERROR_INCORRECT_ENCODING:
            message = "Incorrect Encoding";
            break;
        case XML_ERROR_UNCLOSED_CDATA_SECTION:
            message = "Unclosed CDATA Section";
            break;
        case XML_ERROR_EXTERNAL_ENTITY_HANDLING:
            message = "External Entity Handling";
            break;
    }

    return message;
}


void
BLXMLParser::sStartElementHandler( void *userData,
                                   const XML_Char *name,
                                   const XML_Char **atts)
{
    BLXMLParser * t = (BLXMLParser *) userData;

    XML_Char **attsPtr = (XML_Char**) atts;
    XML_Char  *attName, *attValue;

    XMLElement  * parent = (XMLElement *) t->mElements.top();
    XMLElement  * newNode = new XMLElement(parent, name);

    if(parent)
        parent->mChildren.add(newNode);
    else
        t->mRoot = newNode;
```

```
    while(*attsPtr != 0)
    {
        attName = *attsPtr++;
        attValue = *attsPtr;
        newNode->addAttribute(attName, attValue);
        attsPtr++;
    }

    t->mElements.push(newNode);
}


void
BLXMLParser::sEndElementHandler(   void *userData,
                                   const XML_Char */*name*/)

{
    BLXMLParser * t = (BLXMLParser *) userData;

    t->mElements.pop();

    // At some point, incremental rendering could work by
    // seeing if a card element was just popped.
}


void
BLXMLParser::sCharacterDataHandler(    void *userData,
                                       const XML_Char *s,
                                       int len)

{
    BLXMLParser * t = (BLXMLParser *) userData;

    XMLElement  * parent = (XMLElement *) t->mElements.top();
    XMLTextNode * textNode = new XMLTextNode(parent, s, len);

    parent->mChildren.add(textNode);
}

// BLXMLParser.h

#pragma once

#include "XMLParse.h"
#include "BLStack.h"
#include "BLVector.h"
#include "BLTypes.h"
#include "BLMemoryManager.h"

class XMLAttribute
{
    public:

                                XMLAttribute()
                                : mName(NULL), mValue(NULL) {}

                                XMLAttribute(   const XML_Char * name,
                                                const XML_Char * value);


                XML_Char *  mName;
                XML_Char *  mValue;
};


class XMLElement : public BLNode
{
    public:

        enum { kChildrenInc = 4, kAttrInc = 2 };

                                XMLElement( XMLElement *     parent,
                                            const XML_Char * name);

        virtual void            addAttribute(   const XML_Char * name,
                                                const XML_Char * value);
```

```
        CharPtr         getAttributeValue(CharPtr attrName, CharPtr defaultValue = NULL);

        void *          operator new(size_t);
        void            operator delete(void *, size_t);

        XMLElement *                        mParent;
        BLVector<XMLElement *, kChildrenInc>    mChildren;
        BLVector<XMLAttribute, kAttrInc>        mAttributes;

        XML_Char *  mName;

    static  void        flushAll() { sMemManager.flushAll(); }
    static  BLMemoryManager sMemManager;

};


class XMLTextNode : public XMLElement
{
    public:
                            XMLTextNode(XMLElement *     parent,
                                        const XML_Char * data,
                                        int              len);


                XML_Char *  mText;
                int         mLength;
};


class BLXMLParser : public DataReader
{
    public:

                            BLXMLParser(RawPageData * rawPage);
        virtual             ~BLXMLParser();

        virtual XMLElement * parse();
        virtual char *      reportError();

        virtual void read(char * buffer, ULong length);

    protected:

                char *      mFile;
                UInt        mFileLength;

                XML_Parser  mParser;
                BLStack     mElements;

                XMLElement  *   mRoot;

                bool        mCachedPage;


        static  void        sStartElementHandler(   void *userData,
                                                    const XML_Char *name,
                                                    const XML_Char **atts);


        static  void        sEndElementHandler(     void *userData,
                                                    const XML_Char *name);


        static  void        sCharacterDataHandler(  void *userData,
                                                    const XML_Char *s,
                                                    int len);

};// BLXMLView.cpp

#include "BLXMLView.h"


BLXMLView::BLXMLView(   BLURLHandler *  urlHandler,
                        RectanglePtr    rect,
                        CharPtr         xmlData,
                        int             dataLength,
                        ScrollBarPtr    scrollBar)
    :   mParser(xmlData, dataLength)
```

```
{
    mURLHandler =   urlHandler;
    mRect =         rect;
    mScrollBar =    scrollBar;
    mRoot =         NULL;
}


BLXMLView::~BLXMLView()
{
}


Boolean
BLXMLView::handleEvent(EventPtr eventP)
{
    Boolean handled = false;

    return handled;
}


void
BLXMLView::draw()
{
    if(mRoot == NULL)
        layout();
}


void
BLXMLView::layout()
{
    mRoot = mParser.parse();


}

// BLXMLView.h

#include "BLView.h"
#include "BLXMLParser.h"
#include "BLURLHandler.h"
#include "BLGlyph.h"

class BLXMLView : public BLView
{
    public:

                            BLXMLView(  BLURLHandler *  urlHandler,
                                        RectanglePtr    rect,
                                        CharPtr         xmlData,
                                        int             dataLength,
                                        ScrollBarPtr    scrollBar);


        virtual             ~BLXMLView();

        virtual Boolean     handleEvent(EventPtr eventP);

        virtual void        draw();

        virtual void        layout();

    protected:

                BLXMLParser     mParser;
                XMLElement *    mRoot;

                BLURLHandler *  mURLHandler;
                RectanglePtr    mRect;
                ScrollBarPtr    mScrollBar;
};// BrowserApp.cpp

#include "BrowserApp.h"
#include "BLPrefs.h"
```

```
BrowserApp::BrowserApp()
{
    mWmlForm = NULL;
}


BrowserApp::~BrowserApp()
{
    delete mWmlForm;
}


DWord
BrowserApp::launchNormal()
{
/*  Byte *LPICF = (Byte *) 0xFFFFFA20;
    Byte *LVPW = (Byte *) 0xFFFFFA05;

    *LPICF |= 0x02;
    *LVPW <<= 2;*/

    initialize();

    if(!BLUtils::checkExpirationDate())
        return 0;

    BLGlyph::setMemoryManagers();

    BLPrefs::read();

    mWmlForm = new BLWMLForm(&mNetwork, MainForm, MainViewGadget, MainVertScrollBar,
MainHorizScrollBar);
    registerHandler(mWmlForm);

    startNetworking();

    FrmGotoForm(MainForm);

    DWord returnVal = eventLoop();

    stopNetworking();

    BLPrefs::write();

//   *LVPW >>= 2;
//  *LPICF &= 0xFC;

    return returnVal;
}// BrowserApp.h

#include "BLApplication.h"
#include "BLWMLForm.h"
#include "BLBookmark.h"

class BrowserApp : public BLApplication
{
    public:

        enum {  appFileCreator = 'blkl', kPrefsVersion = 0x1 };

                                BrowserApp();
        virtual                 ~BrowserApp();

        virtual DWord           launchNormal();

    protected:

        BLWMLForm * mWmlForm;

};//    Header generated by Constructor for PalmOS 1.2
//
//  Generated at 9:43:55 PM on Tuesday, June 13, 2000
//
//  Generated for file: G:\Code\bluelark\app\browser\Src\BrowserRsc1.rsrc
```

```
//
// THIS IS AN AUTOMATICALLY GENERATED HEADER FILE FROM CONSTRUCTOR FOR PALMOS;
// - DO NOT EDIT - CHANGES MADE TO THIS FILE WILL BE LOST
//
// Palm App Name:      "Blazer"
//
// Palm App Version:      "1.0"


// Resource: tFRM 2537
#define PreferencesForm                           2537 //(Left Origin = 2, Top Origin = 2,
Width = 156, Height = 156, Usable = 1, Modal = 1, Save Behind = 1, Help ID = 0, Menu Bar ID
= 0, Default Button ID = 0)
#define PreferencesOKButton                       2541 //(Left Origin = 36, Top Origin = 132,
Width = 25, Height = 12, Usable = 1, Anchor Left = 1, Frame = 1, Non-bold Frame = 1, Font =
Standard)
#define PreferencesCancelButton                   2542 //(Left Origin = 90, Top Origin = 132,
Width = 36, Height = 12, Usable = 1, Anchor Left = 1, Frame = 1, Non-bold Frame = 1, Font =
Standard)
#define PreferencesShowImagesCheckbox             2538 //(Left Origin = 10, Top Origin = 72,
Width = 123, Height = 19, Usable = 1, Selected = 0, Group ID = 0, Font = Bold)
#define PreferencesServerField                   2544 //(Left Origin = 25, Top Origin = 41,
Width = 119, Height = 13, Usable = 1, Editable = 1, Underline = 1, Single Line = 0, Dynamic
Size = 0, Left Justified = 1, Max Characters = 80, Font = Standard, Auto Shift = 0, Has
Scroll Bar = 0, Numeric = 0)
#define PreferencesUnnamed2543GrafittiShift       2543 //(Left Origin = 135, Top Origin =
134)
#define PreferencesServerLabel                    2540 //(Left Origin = 8, Top Origin = 25,
Usable = 1, Font = Bold)
#define PreferencesFormGroupID                    0


// Resource: tFRM 2500
#define GotoPageForm                              2500 //(Left Origin = 2, Top Origin = 25,
Width = 156, Height = 72, Usable = 1, Modal = 1, Save Behind = 1, Help ID = 0, Menu Bar ID =
2651, Default Button ID = 0)
#define GotoPageGoButton                          2503 //(Left Origin = 35, Top Origin = 56,
Width = 30, Height = 12, Usable = 1, Anchor Left = 1, Frame = 1, Non-bold Frame = 1, Font =
Standard)
#define GotoPageCancelButton                      2504 //(Left Origin = 108, Top Origin = 56,
Width = 35, Height = 12, Usable = 1, Anchor Left = 1, Frame = 1, Non-bold Frame = 1, Font =
Standard)
#define GotoPageURLField                          2501 //(Left Origin = 31, Top Origin = 16,
Width = 119, Height = 37, Usable = 1, Editable = 1, Underline = 1, Single Line = 0, Dynamic
Size = 0, Left Justified = 1, Max Characters = 120, Font = Standard, Auto Shift = 0, Has
Scroll Bar = 0, Numeric = 0)
#define GotoPageUnnamed2505GrafittiShift          2505 //(Left Origin = 147, Top Origin = 58)
#define GotoPageURLLabel                          2502 //(Left Origin = 4, Top Origin = 17,
Usable = 1, Font = Bold)


// Resource: tFRM 2507
#define BookmarksEditForm                         2507 //(Left Origin = 2, Top Origin = 2,
Width = 156, Height = 156, Usable = 1, Modal = 1, Save Behind = 1, Help ID = 0, Menu Bar ID
= 2645, Default Button ID = 0)
#define BookmarksEditOKButton                     2508 //(Left Origin = 3, Top Origin = 141,
Width = 25, Height = 12, Usable = 1, Anchor Left = 1, Frame = 1, Non-bold Frame = 1, Font =
Standard)
#define BookmarksEditDetailsButton                2509 //(Left Origin = 69, Top Origin = 141,
Width = 42, Height = 12, Usable = 1, Anchor Left = 1, Frame = 1, Non-bold Frame = 1, Font =
Standard)
#define BookmarksEditDeleteButton                 2510 //(Left Origin = 118, Top Origin =
141, Width = 35, Height = 12, Usable = 1, Anchor Left = 1, Frame = 1, Non-bold Frame = 1,
Font = Standard)
#define BookmarksEditNewButton                    2511 //(Left Origin = 35, Top Origin = 141,
Width = 27, Height = 12, Usable = 1, Anchor Left = 1, Frame = 1, Non-bold Frame = 1, Font =
Standard)
#define BookmarksEditListList                     2512 //(Left Origin = 8, Top Origin = 19,
Width = 140, Usable = 1, Font = Standard, Visible Items = 10)


// Resource: tFRM 2517
#define BookmarksAddForm                          2517 //(Left Origin = 2, Top Origin = 40,
Width = 156, Height = 118, Usable = 1, Modal = 1, Save Behind = 1, Help ID = 0, Menu Bar ID
```

```
= 2650, Default Button ID = 0)
#define BookmarksAddOKButton                      2520 //(Left Origin = 21, Top Origin = 101,
Width = 25, Height = 12, Usable = 1, Anchor Left = 1, Frame = 1, Non-bold Frame = 1, Font =
Standard)
#define BookmarksAddCancelButton                  2521 //(Left Origin = 101, Top Origin =
101, Width = 36, Height = 12, Usable = 1, Anchor Left = 1, Frame = 1, Non-bold Frame = 1,
Font = Standard)
#define BookmarksAddNameField                     2522 //(Left Origin = 35, Top Origin = 20,
Width = 115, Height = 25, Usable = 1, Editable = 1, Underline = 1, Single Line = 0, Dynamic
Size = 0, Left Justified = 1, Max Characters = 80, Font = Standard, Auto Shift = 1, Has
Scroll Bar = 0, Numeric = 0)
#define BookmarksAddURLField                      2523 //(Left Origin = 36, Top Origin = 45,
Width = 115, Height = 50, Usable = 1, Editable = 1, Underline = 1, Single Line = 0, Dynamic
Size = 0, Left Justified = 1, Max Characters = 120, Font = Standard, Auto Shift = 0, Has
Scroll Bar = 0, Numeric = 0)
#define BookmarksAddGraffitiShiftGrafittiShift    2524 //(Left Origin = 142, Top Origin =
103)
#define BookmarksAddUnnamed2518Label              2518 //(Left Origin = 2, Top Origin = 21,
Usable = 1, Font = Bold)
#define BookmarksAddUnnamed2519Label              2519 //(Left Origin = 9, Top Origin = 46,
Usable = 1, Font = Bold)


// Resource: tFRM 2527
#define BookmarksDetailsForm                      2527 //(Left Origin = 2, Top Origin = 40,
Width = 156, Height = 118, Usable = 1, Modal = 1, Save Behind = 1, Help ID = 0, Menu Bar ID
= 2650, Default Button ID = 0)
#define BookmarksDetailsOKButton                  2530 //(Left Origin = 21, Top Origin = 101,
Width = 25, Height = 12, Usable = 1, Anchor Left = 1, Frame = 1, Non-bold Frame = 1, Font =
Standard)
#define BookmarksDetailsCancelButton              2531 //(Left Origin = 101, Top Origin =
101, Width = 36, Height = 12, Usable = 1, Anchor Left = 1, Frame = 1, Non-bold Frame = 1,
Font = Standard)
#define BookmarksDetailsOfflineCheckbox           2536 //(Left Origin = 122, Top Origin = 82,
Width = 14, Height = 14, Usable = 1, Selected = 0, Group ID = 0, Font = Standard)
#define BookmarksDetailsNameField                2532 //(Left Origin = 35, Top Origin = 20,
Width = 115, Height = 25, Usable = 1, Editable = 1, Underline = 1, Single Line = 0, Dynamic
Size = 0, Left Justified = 1, Max Characters = 80, Font = Standard, Auto Shift = 1, Has
Scroll Bar = 0, Numeric = 0)
#define BookmarksDetailsURLField                  2533 //(Left Origin = 35, Top Origin = 45,
Width = 115, Height = 40, Usable = 1, Editable = 1, Underline = 1, Single Line = 0, Dynamic
Size = 0, Left Justified = 1, Max Characters = 120, Font = Standard, Auto Shift = 0, Has
Scroll Bar = 0, Numeric = 0)
#define BookmarksDetailsGraffitiShiftGrafittiShift 2534   //(Left Origin = 142, Top Origin =
103)
#define BookmarksDetailsNameLabel                 2528 //(Left Origin = 2, Top Origin = 21,
Usable = 1, Font = Bold)
#define BookmarksDetailsURLLabel                  2529 //(Left Origin = 9, Top Origin = 46,
Usable = 1, Font = Bold)
#define BookmarksDetailsOfflineLabel              2535 //(Left Origin = 3, Top Origin = 83,
Usable = 1, Font = Bold)
#define DetailsFormGroupID                        0


// Resource: tFRM 2700
#define BlazerAboutForm                           2700 //(Left Origin = 2, Top Origin = 2,
Width = 156, Height = 156, Usable = 1, Modal = 1, Save Behind = 1, Help ID = 0, Menu Bar ID
= 0, Default Button ID = 0)
#define BlazerAboutOKButton                       2702 //(Left Origin = 64, Top Origin = 131,
Width = 36, Height = 12, Usable = 1, Anchor Left = 1, Frame = 1, Non-bold Frame = 1, Font =
Standard)
#define BlazerAboutVoyagerNameLabel               2701 //(Left Origin = 47, Top Origin = 28,
Usable = 1, Font = Bold 12)
#define BlazerAboutNamesLabel                     2704 //(Left Origin = 27, Top Origin = 81,
Usable = 1, Font = Standard)
#define BlazerAboutUnnamed2705Label               2705 //(Left Origin = 21, Top Origin = 58,
Usable = 1, Font = Standard)


// Resource: tFRM 1000
#define MainForm                                  1000 //(Left Origin = 0, Top Origin = 0,
Width = 160, Height = 160, Usable = 1, Modal = 0, Save Behind = 0, Help ID = 0, Menu Bar ID
= 2640, Default Button ID = 0)
#define MainLeftArrowButton                       1006 //(Left Origin = 107, Top Origin = 0,
Width = 10, Height = 13, Usable = 1, Anchor Left = 1, Frame = 0, Non-bold Frame = 1, Font =
```

```
Standard)
#define MainRightArrowButton                    1007//(Left Origin = 134, Top Origin = 0,
Width = 10, Height = 13, Usable = 1, Anchor Left = 1, Frame = 0, Non-bold Frame = 1, Font =
Standard)
#define MainHomeButton                          1008//(Left Origin = 119, Top Origin = 0,
Width = 13, Height = 13, Usable = 1, Anchor Left = 1, Frame = 0, Non-bold Frame = 1, Font =
Standard)
#define MainOpenButton                          1011//(Left Origin = 93, Top Origin = 0,
Width = 13, Height = 13, Usable = 1, Anchor Left = 1, Frame = 0, Non-bold Frame = 1, Font =
Standard)
#define MainLeftArrowBitMap                     1000//(Left Origin = 107, Top Origin = 0,
Bitmap Resource ID = 1000, Usable = 1)
#define MainRightArrowBitMap                    1100//(Left Origin = 134, Top Origin = 0,
Bitmap Resource ID = 1100, Usable = 1)
#define MainHomeBitMap                          1200//(Left Origin = 119, Top Origin = 0,
Bitmap Resource ID = 1200, Usable = 1)
#define MainOpenBitMap                          2711//(Left Origin = 93, Top Origin = 0,
Bitmap Resource ID = 2711, Usable = 1)
#define MainViewGadget                          1002//(Left Origin = 0, Top Origin = 18,
Width = 153, Height = 142, Usable = 1)
#define MainBookmarksPopListList                1009//(Left Origin = 86, Top Origin = 1,
Width = 72, Usable = 0, Font = Standard, Visible Items = 0)
#define MainBookmarkPopTrigger                  1010//(Left Origin = 144, Top Origin = 0,
Width = 0, Height = 13, Usable = 1, Anchor Left = 1, Font = Standard, List ID = 1009)
#define MainVertScrollBar                       1001//(Left Origin = 153, Top Origin = 17,
Width = 7, Height = 143, Usable = 1, Value = 0, Minimum Value = 0, Maximum Value = 0, Page
Size = 0)
#define MainHorizScrollBar                      1013//(Left Origin = 0, Top Origin = 153,
Width = 151, Height = 7, Usable = 1, Value = 0, Minimum Value = 0, Maximum Value = 0, Page
Size = 0)


//  Resource: tFRM 1100
#define TextEntryForm                           1100//(Left Origin = 2, Top Origin = 13,
Width = 156, Height = 144, Usable = 1, Modal = 1, Save Behind = 1, Help ID = 0, Menu Bar ID
= 0, Default Button ID = 0)
#define TextEntryOKButton                       1103//(Left Origin = 34, Top Origin = 129,
Width = 36, Height = 12, Usable = 1, Anchor Left = 1, Frame = 1, Non-bold Frame = 1, Font =
Standard)
#define TextEntryCancelButton                   1104//(Left Origin = 87, Top Origin = 129,
Width = 36, Height = 12, Usable = 1, Anchor Left = 1, Frame = 1, Non-bold Frame = 1, Font =
Standard)
#define TextEntryTextField                      1101//(Left Origin = 3, Top Origin = 20,
Width = 144, Height = 104, Usable = 1, Editable = 1, Underline = 1, Single Line = 0, Dynamic
Size = 0, Left Justified = 1, Max Characters = 80, Font = Standard, Auto Shift = 0, Has
Scroll Bar = 0, Numeric = 0)
#define TextEntryTextScrollBar                  1102//(Left Origin = 146, Top Origin = 20,
Width = 7, Height = 105, Usable = 0, Value = 0, Minimum Value = 0, Maximum Value = 0, Page
Size = 0)


//  Resource: Talt 2570
#define BookmarkDetailsAlert                    2570
#define BookmarkDetailsOK                       0

//  Resource: Talt 2571
#define BookmarkDeleteAlert                     2571
#define BookmarkDeleteOK                        0

//  Resource: Talt 1000
#define DownloadErrorAlert                      1000
#define DownloadErrorOK                         0

//  Resource: Talt 1100
#define CustomAlert                             1100
#define CustomOK                                0

//  Resource: MBAR 2640
#define BrowsingFormMenuBar                     2640

//  Resource: MBAR 2645
#define BookmarkFormMenuBar                     2645

//  Resource: MBAR 2650
#define BookmarkEditFormMenuBar                 2650
```

```
//  Resource: MBAR 2651
#define GotoFormMenuBar                         2651

//  Resource: MENU 2680
#define OptionsMenu                             2680
#define OptionsPreferences                      2680//  Command Key: R
#define OptionsAboutBlazer                      2682

//  Resource: MENU 2650
#define BrowserPageMenu                         2650
#define BrowserPageGoto                         2650//  Command Key: G
#define BrowserPageBack                         2652
#define BrowserPageForward                      2653
#define BrowserPageHome                         2654
#define BrowserPageStop                         2656

//  Resource: MENU 2660
#define BookmarkEditMenu                        2660
#define BookmarkEditCut                         2660//  Command Key: X
#define BookmarkEditCopy                        2661//  Command Key: C
#define BookmarkEditPaste                       2662//  Command Key: P
#define BookmarkEditUndo                        2663//  Command Key: U
#define BookmarkEditSelectAll                   2664//  Command Key: S
#define BookmarkEditKeyboard                    2666//  Command Key: K
#define BookmarkEditGraffiti                    2667//  Command Key: G

//  Resource: MENU 2670
#define BrowserEditMenu                         2670
#define BrowserEditBookmarks                    2670//  Command Key: B

//  Resource: tSTR 2450
#define DefaultProtocolString                   2450// "http://"

//  Resource: tSTR 2460
#define DefaultHomePageString                   2460// "http://www.yahoo.com/"

//  Resource: PICT 2710
#define VoyagerLogoBitmap                       2710
//  Resource: PICT 1000
#define LeftArrowBitmap                         1000
//  Resource: PICT 1100
#define RightArrowBitmap                        1100
//  Resource: PICT 1200
#define HomeBitmap                              1200
//  Resource: PICT 2711
#define OpenBitmap                              2711
//  Resource: PICT 1300
#define DownArrowBitmap                         1300// HTTPRequest.cpp

#include "HTTPRequest.h"
#include "BLUtils.h"
#include <System/unix/sys_socket.h>
#include <System/unix/sys_errno.h>
#include <unix_string.h>

const int kBufferSize = 512;

// global:
Err errno;


// !!! make safe with buffer overflows


HTTPRequest::HTTPRequest(  int sock,
                           char *hostname)
{
    mSocket = sock;
    mHostname = BLUtils::cloneString(hostname);
    mContentType = NULL;
    mContentLength = 0;
    mContentLocation = NULL;
    mEncodingType = kRaw;
}
```

```
HTTPRequest::~HTTPRequest()
{
    close(mSocket);

    delete[] mHostname;
    delete[] mContentType;
    delete[] mContentLocation;
}


int
HTTPRequest::requestFile(char *path)
{
    // swiped from the WebCrawler example

    if(path == NULL)
        return -1;

    int commandsize =
        (int) StrLen(path)
      + (int) StrLen(mHostname)
      + 20 // Extra
      + 1 // NUL byte
      + 16; // Protocol filler...

    char buffer[kBufferSize];

    StrPrintF(buffer, "GET %s HTTP/1.1\r\n", path);

    // Send the GET command to the connected server.
    if(send(mSocket, buffer, StrLen(buffer), 0) > 0)
    {
        StrPrintF(buffer, "user-agent: Blazer\r\n");

        // IMP: The length of the command has to be sent!
        int retval = send(mSocket, buffer, StrLen(buffer), 0);

        if (retval <= 0)
          return -1;

        StrPrintF(buffer, "Host: %s\r\n\r\n", mHostname);

        // IMP: The length of the command has to be sent!
        retval = send(mSocket, buffer, StrLen(buffer), 0);

        if (retval <= 0)
          return -1;
        else
          return retval;
    }
    else
        return -1;
}


bool
HTTPRequest::parseHTTPHeader()
{
    int status = readStatusLine();
    int contentLength = 0;

    switch(status)
    {
        case 200:
            if(parseHeaders() == -1)
                return false;
            else
                return true;

            break;

        default:
            return false;
```

```
            break;
}


int
HTTPRequest::readStatusLine()
{
    char    linebuff[kBufferSize];

    int     majorVersion = 0;
    int     minorVersion = 0;
    int     status = 0;
    int     length = 0;
    int     pos = 0;

    if((length = readline(linebuff, kBufferSize)) == -1)
        return -1;

    if(length < 5)
        return -1;

    if(!(StrNCompare(linebuff, "HTTP/", 5) == 0))
        return -1;

    pos = 5;

    if(pos >= length)
        return -1;

    while(linebuff[pos] != ' ')
    {
        pos++;

        if(pos >= length)
            return -1;
    }

    pos++;

    if((length - pos) > 0)
        status = (int) StrAToI(&linebuff[pos]);
    else
        return -1;

    return status;
}


int
HTTPRequest::parseHeaders()
{
    char buf[kBufferSize];

    CharPtr originalContentLoc = mContentLocation;

    bool hasNewLocation = false;

    mEncodingType = kRaw;

    while(true)
    {
        if (readline(buf, kBufferSize) == -1)
            return -1;

        if (buf[0] == '\0')
            break;

        char *cp = StrChr(buf, ':');
        if (cp == NULL)
            return -1;
        *cp = '\0';

        while (*(++cp) == ' ')
            ; //skip spaces
```

```
        if(StrCaselessCompare(buf, "content-type") == 0)
        {
            mContentType = BLUtils::cloneString(cp);
        }
        else if(StrCaselessCompare(buf, "content-length") == 0)
        {
            mContentLength = (int) StrAToI(cp);
        }
        else if(StrCaselessCompare(buf, "content-location") == 0)
        {
            hasNewLocation = true;
            mContentLocation = BLUtils::cloneString(cp);
        }
        else if(StrCaselessCompare(buf, "transfer-encoding") == 0)
        {
            if(StrCaselessCompare(cp, "chunked") == 0)
                mEncodingType = kChunked;
            else
                mEncodingType = kUnknown;
        }
    }

    if(hasNewLocation)
    {
        delete[] originalContentLoc;
    }

    return 0;
}


int
HTTPRequest::readline(char *buf, int size)
{
    char c = 0;
    int rc = 0;
    int i;

    for (i=0; i<size-1; i++)
    {
        if ((rc = read(mSocket, &c, 1)) == 1)
        {
            if (c == '\n')
                break;
            if (c == '\r') {
                i--;
                continue;
            }

            buf[i] = c;
        }
        else if (rc == 0)
        {
            return -1;
        }
        else
        {
            if (errno == EWOULDBLOCK)
                rc++;
        }
    }

    buf[i] = '\0';
    return (int) StrLen(buf);
}
// HTTPRequest.h

#pragma once

class HTTPRequest
{
    public:

            enum EncodingType { kUnknown=0, kChunked, kRaw };
```

```
                    HTTPRequest(
                                int socket,
                                char *hostname);
                    ~HTTPRequest();

            int     requestFile(char *path);

            bool    parseHTTPHeader();
            int     getContentLength()          { return mContentLength; }
            char*   getContentType()            { return mContentType; }
            char*   getContentLocation()        { return mContentLocation; }
            EncodingType getEncodingType()      { return mEncodingType; }

            int     getSock() { return mSocket; }

    protected:

            int     readStatusLine();
            int     parseHeaders();
            int     readline(char *buf, int size);

            int     mSocket;

            CharPtr mHostname;
            CharPtr mContentType;
            CharPtr mContentLocation;
            int     mContentLength;
            EncodingType    mEncodingType;
};

// Main.cpp

#include "BrowserApp.h"

static Err romVersionCompatible(DWord requiredVersion, Word launchFlags);

DWord PilotMain(Word cmd, Ptr /*cmdPBP*/, Word launchFlags)
{
    switch(cmd)
    {
        case sysAppLaunchCmdNormalLaunch:
        {
            Err error = romVersionCompatible(kMinOSVersionNeeded, launchFlags);

            if (error)
                return error;

            BrowserApp app;
            return app.launchNormal();
        }

        default:
            break;
    }

    return 0;
}


Err romVersionCompatible(DWord requiredVersion, Word launchFlags)
{
    DWord romVersion;

    // See if we're on in minimum required version of the ROM or later.
    FtrGet(sysFtrCreator, sysFtrNumROMVersion, &romVersion);
    if (romVersion < requiredVersion)
    {
        if ((launchFlags & (sysAppLaunchFlagNewGlobals | sysAppLaunchFlagUIApp)) ==
            (sysAppLaunchFlagNewGlobals | sysAppLaunchFlagUIApp))
        {
    //      FrmAlert (RomIncompatibleAlert);

            // Pilot 1.0 will continuously relaunch this app unless we switch to
```

```
        // another safe one.
        if (romVersion < sysMakeROMVersion(2,0,0,sysROMStageRelease,0))
            AppLaunchWithCommand(sysFileCDefaultApp, sysAppLaunchCmdNormalLaunch, NULL);
    }

        return sysErrRomIncompatible;
    }

    return 0;
}
// PrecompiledHeaders.pch++


#ifndef PILOT_PRECOMPILED_HEADERS_OFF

#include <SysAll.h>
#include <UIAll.h>

#define ENABLE_NETWORKING

#ifdef ENABLE_NETWORKING

enum {
    firstINetLibEvent = 0x1000,
    firstWebLibEvent = 0x1100
};

#include <NetMgr.h>
#include <INetMgr.h>
#include <CTP.h>

#define BERKELEY_SOCKETS
#endif

#include "BrowserRsc1_res.h"

const DWord kMinOSVersionNeeded = sysMakeROMVersion(3,0,0,sysROMStageRelease,0);

#define kHTTPGateway "proxy.bluelark.net"
//#define kHTTPGateway "haze.bluelark.net"
//#define kHTTPGateway "red.bluelark.net"
//#define kHTTPGateway "63.203.230.69"
//#define kDefaultPage "blue.bluelark.net/home.wml"
#define kDefaultPage "blue.bluelark.net/~jkleid/options.wml"

#define kURLPrefix "/http/"

const DateType kExpirationDate = {96, 6, 18};
const int kHTTPPort = 80;
//const int kHTTPPort = 7777;

#pragma precompile_target "WMLBrowser.h++.mch"

#endif// WBXMLConstants.h

#pragma once

enum XMLGlobalToken
{
    TOK_SWITCH_PAGE = 0x0,
    TOK_END,
    TOK_ENTITY,
    TOK_STR_I,
    TOK_LITERAL,

    TOK_EXT_I_0 = 0x40,
    TOK_EXT_I_1,
    TOK_EXT_I_2,
    TOK_PI,
    TOK_LITERAL_C,

    TOK_EXT_T_0 = 0x80,
    TOK_EXT_T_1,
    TOK_EXT_T_2,
    TOK_STR_T,
```

```
    TOK_LITERAL_A,
    TOK_EXT_0 = 0xC0,
    TOK_EXT_1,
    TOK_EXT_2,
    TOK_OPAQUE,
    TOK_LITERAL_AC
};

enum WMLTagToken
{
    TAG_A = 0x1C,
    TAG_TD,
    TAG_TR,
    TAG_TABLE,

    TAG_P = 0x20,
    TAG_POSTFIELD,
    TAG_ANCHOR,
    TAG_ACCESS,
    TAG_B,
    TAG_BIG,
    TAG_BR,
    TAG_CARD,
    TAG_DO,
    TAG_EM,
    TAG_FIELDSET,
    TAG_GO,
    TAG_HEAD,
    TAG_I,
    TAG_IMG,
    TAG_INPUT,

    TAG_META = 0x30,
    TAG_NOOP,
    TAG_PREV,
    TAG_ONEVENT,
    TAG_OPTGROUP,
    TAG_OPTION,
    TAG_REFRESH,
    TAG_SELECT,
    TAG_SMALL,
    TAG_STRONG,
    // NULL
    TAG_TEMPLATE = 0x3B,
    TAG_TIMER,
    TAG_U,
    TAG_SETVAR,
    TAG_WML
};


enum WMLAttr
{
    ATTR_ACCEPT_CHARSET = 0x05,
    ATTR_ALIGN_BOTTOM,
    ATTR_ALIGN_CENTER,
    ATTR_ALIGN_LEFT,
    ATTR_ALIGN_MIDDLE,
    ATTR_ALIGN_RIGHT,
    ATTR_ALIGN_TOP,
    ATTR_ALT,
    ATTR_CONTENT,
    // NULL
    ATTR_DOMAIN = 0x0F,

    ATTR_EMPTYTOK_FALSE = 0x10,
    ATTR_EMPTYTOK_TRUE,
    ATTR_FORMAT,
    ATTR_HEIGHT,
    ATTR_HSPACE,
    ATTR_IVALUE,
    ATTR_INAME,
    // NULL
```

```
    ATTR_LABEL = 0x18,
    ATTR_LOCALSRC,
    ATTR_MAXLENGTH,
    ATTR_METHOD_GET,
    ATTR_METHOD_POST,
    ATTR_MODE_NOWRAP,
    ATTR_MODE_WRAP,
    ATTR_MULTIPLE_FALSE,

    ATTR_MULTIPLE_TRUE = 0x20,
    ATTR_NAME,
    ATTR_NEWCONTEXT_FALSE,
    ATTR_NEWCONTEXT_TRUE,
    ATTR_ONPICK,
    ATTR_ONENTERBACKWARD,
    ATTR_ONENTERFORWARD,
    ATTR_ONTIMER,
    ATTR_OPTIONAL_FALSE,
    ATTR_OPTIONAL_TRUE,
    ATTR_PATH,
    // NULL
    // NULL
    // NULL
    ATTR_SCHEME = 0x2E,
    ATTR_SENDREFERER_FALSE,

    ATTR_SENDREFERER_TRUE = 0x30,
    ATTR_SIZE,
    ATTR_SRC,
    ATTR_ORDERED_TRUE,
    ATTR_ORDERED_FALSE,
    ATTR_TABINDEX,
    ATTR_TITLE,
    ATTR_TYPE,
    ATTR_TYPE_ACCEPT,
    ATTR_TYPE_DELETE,
    ATTR_TYPE_HELP,
    ATTR_TYPE_PASSWORD,
    ATTR_TYPE_ONPICK,
    ATTR_TYPE_ONENTERBACKWARD,
    ATTR_TYPE_ONENTERFORWARD,
    ATTR_TYPE_ONTIMER,

    // NULL
    // NULL
    // NULL
    // NULL
    // NULL
    ATTR_TYPE_OPTIONS = 0x45,
    ATTR_TYPE_PREV,
    ATTR_TYPE_RESET,
    ATTR_TYPE_TEXT,
    ATTR_TYPE_VND,
    ATTR_HREF,
    ATTR_HREF_HTTP,
    ATTR_HREF_HTTPS,
    ATTR_VALUE,
    ATTR_VSPACE,
    ATTR_WIDTH,

    ATTR_XML_LANG = 0x50,
    // NULL
    ATTR_ALIGN = 0x52,
    ATTR_COLUNMNS,
    ATTR_CLASS,
    ATTR_ID,
    ATTR_FORUA_FALSE,
    ATTR_FORUA_TRUE,
    ATTR_SRC_HTTP,
    ATTR_SRC_HTTPS,
    ATTR_HTTP_EQUIV,
    ATTR_HTTP_EQUIV_CONTENT_TYPE,
    ATTR_CONTENT_APPLICATION_VND_WAP_WMLC_CHARSET,
    ATTR_HTTP_EQUIV_EXPIRES,
    ATTR_ACCESS_KEY,
```

```
    ATTR_ENCTYPE,
    ATTR_ENCTYPE_URL_ENCODED = 0x60,
    ATTR_ENCTYPE_FORM_DATA
};


enum WMLValue
{
    VALUE_DOT_COM = 0x85,
    VALUE_DOT_EDU,
    VALUE_DOT_NET,
    VALUE_DOT_ORG,
    VALUE_ACCEPT,
    VALUE_BOTTOM,
    VALUE_CLEAR,
    VALUE_DELETE,
    VALUE_HELP,
    VALUE_HTTP,
    VALUE_HTTP_WWW,

    VALUE_HTTPS = 0x90,
    VALUE_HTTPS_WWW,
    // NULL
    VALUE_MIDDLE = 0x93,
    VALUE_NOWRAP,
    VALUE_ONPICK,
    VALUE_ONENTERBACKWARD,
    VALUE_ONENTERFORWARD,
    VALUE_ONTIMER,
    VALUE_OPTIONS,
    VALUE_PASSWORD,
    VALUE_RESET,
    // NULL
    VALUE_TEXT = 0x9D,
    VALUE_TOP,
    VALUE_UNKNOWN,

    VALUE_WRAP = 0xA0,
    VALUE_WWW
};

// WBXMLParser.cpp

#include "WBXMLParser.h"
#include "WBXMLConstants.h"
#include "BLWMLTable.h"
#include "BLWMLActions.h"
#include "BLUtils.h"

BLGlyph *
WBXMLParser::sCurrentGlyph = NULL;

int
WBXMLParser::sOpenTables = 0;

const int kInitStackSize = 8;

const CharPtr kTypeStrings[] =
{
    "Unknown Action",
    "Accept",
    "Previous",
    "Help",
    "Reset",
    "Options",
    "Delete"
};

const TagHandlerType cTags[] =
{
    &WBXMLParser::tag_a,
    &WBXMLParser::tag_td,
    &WBXMLParser::tag_tr,
    &WBXMLParser::tag_table,
```

```
    &WBXMLParser::tag_p,
    &WBXMLParser::tag_postfield,
    &WBXMLParser::tag_anchor,
    &WBXMLParser::tag_access,
    &WBXMLParser::tag_strong,
    &WBXMLParser::tag_big,
    &WBXMLParser::tag_br,
    &WBXMLParser::tag_card,
    &WBXMLParser::tag_do,
    &WBXMLParser::tag_em,
    &WBXMLParser::tag_fieldset,
    &WBXMLParser::tag_go,
    &WBXMLParser::tag_head,
    &WBXMLParser::tag_em,
    &WBXMLParser::tag_img,
    &WBXMLParser::tag_input,

    &WBXMLParser::tag_meta,
    &WBXMLParser::tag_noop,
    &WBXMLParser::tag_prev,
    &WBXMLParser::tag_onevent,
    &WBXMLParser::tag_optgroup,
    &WBXMLParser::tag_option,
    &WBXMLParser::tag_refresh,
    &WBXMLParser::tag_select,
    &WBXMLParser::tag_small,
    &WBXMLParser::tag_strong,
    &WBXMLParser::unknown_tag,
    &WBXMLParser::tag_template,
    &WBXMLParser::tag_timer,
    &WBXMLParser::tag_u,
    &WBXMLParser::tag_setvar,
    &WBXMLParser::tag_wml
};


WBXMLParser::WBXMLParser()
:   mGlyphStack(kInitStackSize),
    mStateStack(kInitStackSize)
{
    mStringTable = NULL;
    mHeaderDone = false;
    mPos = 0;
    mRoot = NULL;
    mCurrTextBuffer = NULL;
    mCurrTextBufferLen = 0;
    mCurrSelectP = NULL;
}


WBXMLParser::~WBXMLParser()
{
}


void
WBXMLParser::parseHeader(ULong &pos)
{
    UChar versionNum = (UChar) mBuffer[pos++];
    if((versionNum < 0x1) || (versionNum > 0x2))
        throw FatalParsingError(FatalParsingError::kFileTypeError);

    mPublicID = parseMultibyteInt(pos);
    if(mPublicID == 0)
        mID_Index = (Byte) mBuffer[pos++];

    mCharSet = parseMultibyteInt(pos);
    mStringTableLen = parseMultibyteInt(pos);

    if(mStringTableLen > 0)
    {
        mStringTable = &mBuffer[pos];
        pos += mStringTableLen;
    }
```

```
        else
        {
            mStringTable = NULL;
        }
}


ULong
WBXMLParser::readData(CharPtr buffer, ULong length)
{
    try {
        mLength = length;
        mBuffer = buffer;

        if(!mHeaderDone)
        {
            ULong workingPos = mPos;

            parseHeader(workingPos);
            mHeaderDone = true;

            mPos = workingPos;

            TopItem * top = new TopItem;
            mGlyphStack.add(top);
            mStateStack.add(mCurrentTextState);
        }

        if(mCurrTextBuffer && !text_run(mPos))
        {
            setCurrGlyph();
            return mPos;
        }

        sCurrentGlyph = NULL;

        while(mPos < length)
        {
            ULong workingPos = mPos;

            if(workingPos >= mLength)
                break;

            mCurrentToken = (Byte) mBuffer[workingPos++];

            Byte tag = (Byte) (mCurrentToken & 0x3F);

            if((tag >= TAG_A) && (tag <= TAG_WML))
            {
                (this->*cTags[tag - TAG_A])(workingPos);
            }
            else
            {
                switch(tag)
                {
                    case TOK_END:
                        BLGlyph * popped = mGlyphStack.popLastElement();
                        mStateStack.removeLast();
                        mCurrentTextState = mStateStack.getLastElement();

                        if(dynamic_cast<WMLTable *>(popped) != NULL)
                            sOpenTables--;

                        else if(dynamic_cast<WMLCard *>(popped) != NULL)
                            dynamic_cast<WMLCard *>(popped)->doneParsing();

                        else if(dynamic_cast<WMLRoot *>(popped) != NULL)
                            return 0;

                        else if(dynamic_cast<TopItem *>(popped) != NULL)
                            throw
FatalParsingError(FatalParsingError::kUnexpectedEndOfStack);

                        break;
```

```
                case TOK_STR_I:
                case TOK_STR_T:
                    workingPos--;
                    if(!text_run(workingPos))
                    {
                        setCurrGlyph();
                        return mPos;
                    }
                    break;
            }
        }

        mPos = workingPos;
    }
}
catch(UnexpectedEOF)
{
    // need more bytes to continue
}
catch(FatalParsingError)
{
    // serious error, cannot continue
    return 0;
}

if((dynamic_cast<TopItem *>(mGlyphStack.getLastElement()) != NULL) && (mRoot != NULL))
{
    sCurrentGlyph = NULL;
    return 0;
}
else
{
    setCurrGlyph();

    if(mPos == 0)
        return 1;

    return mPos;
}
}


void
WBXMLParser::setCurrGlyph()
{
    if((sCurrentGlyph == NULL) && (mGlyphStack.getNumElements() >= 1))
        sCurrentGlyph = mGlyphStack.getLastElement();
}


ULong
WBXMLParser::parseMultibyteInt(ULong &pos)
{   // !!! untested for big ints, as far as I know
    ULong result = 0;

    while(pos < mLength)
    {
        UInt digit = mBuffer[pos++];

        if((digit & 0x80) == 0)
        {
            // no more digits
            result |= digit;
            return result;
        }

        digit &= (UInt) ~0x80;
        result |= digit;
        result <<= 8;
    }

    throw UnexpectedEOF();
}
```

```
Byte
WBXMLParser::parseByte(ULong &pos)
{
    if(pos < mLength)
    {
        return (Byte) mBuffer[pos++];
    }

    throw UnexpectedEOF();
}


CharPtr
WBXMLParser::parseString(ULong &pos, ULong * lengthP, bool parseType)
{
    CharPtr string;
    Byte token = parseByte(pos);

    if(!parseType || (token == TOK_STR_I))
    {
        ULong length = stringLength(pos);

        string = &mBuffer[pos];
        pos += length + 1;

        if(lengthP)
            *lengthP = length;
    }
    else if(token == TOK_STR_T)
    {
        ULong offset = parseMultibyteInt(pos);
        string = mStringTable + offset;

        if(lengthP)
            *lengthP = StrLen(string); // !!! not safe
    }

    return string;
}


CharPtr
WBXMLParser::parseURL(ULong &pos)
{
    Byte token;

    CharPtr string;
    BLVector<CharPtr, 4> stringVector;
    ULong totalLength = 0;

    do {
        string = NULL;
        ULong strLength;

        token = parseByte(pos);

        switch(token)
        {
            case TOK_STR_I:
            case TOK_STR_T:
                string = parseString(--pos, &strLength);
                stringVector.add(string);
                totalLength += strLength;
                string = NULL;
                break;

            case ATTR_SRC:
            case ATTR_HREF:
                break;

            case ATTR_HREF_HTTP:
            case ATTR_SRC_HTTP:
                string = "http://";
                break;
```

```
        case ATTR_HREF_HTTPS:
        case ATTR_SRC_HTTPS:
            string = "https://";
            break;

        case VALUE_HTTP:
            string = "http://";
            break;

        case VALUE_HTTPS:
            string = "https://";
            break;

        case VALUE_HTTP_WWW:
            string = "http://www.";
            break;

        case VALUE_HTTPS_WWW:
            string = "https://www.";
            break;

        case VALUE_WWW:
            string = "www.";
            break;

        case VALUE_DOT_COM:
            string = ".com/";
            break;

        case VALUE_DOT_ORG:
            string = ".org/";
            break;

        case VALUE_DOT_NET:
            string = ".net/";
            break;

        case VALUE_DOT_EDU:
            string = ".edu/";
            break;

        case TOK_END:
        default:
        {
            pos--;
            CharPtr urlP = NULL;
            ULong lenUsed = 0;

            if(totalLength == 0)
                return NULL;

            if(stringVector.getNumElements() == 1)
                return stringVector.getElementAt(0);

            urlP = (CharPtr) BLGlyph::newChunk(totalLength + 1);

            BLIterator<CharPtr, 4> iter(stringVector);

            while(iter.hasNext())
            {
                CharPtr piece = iter.getNext();
                StrCopy(urlP + lenUsed, piece);
                lenUsed += StrLen(piece);
            }

            return urlP;
        }
    }

    if(string != NULL)
    {
        stringVector.add(string);
        totalLength += StrLen(string);
    }
} while(pos < mLength);
```

```
    throw UnexpectedEOF();
}


ULong
WBXMLParser::stringLength(ULong &pos)
{
    ULong length = 0;

    while(mBuffer[pos + length])
    {
        length++;

        if((pos+length) >= mLength)
            throw UnexpectedEOF(pos+length, &mBuffer[pos]);
    }

    return length;
}


WMLTagToken
WBXMLParser::getEnclosingContext(BLGlyph * &foundGlyph)
{
    int i = mGlyphStack.getNumElements();

    while(i > 0)
    {
        foundGlyph = mGlyphStack.getElementAt(--i);

        if(dynamic_cast<WMLParagraph *>(foundGlyph))
            return TAG_P;

        else if(dynamic_cast<WMLCard *>(foundGlyph))
            return TAG_CARD;

        else if(dynamic_cast<WMLHead *>(foundGlyph))
            return TAG_HEAD;

        else if(dynamic_cast<WMLTemplate *>(foundGlyph))
            return TAG_TEMPLATE;

        else if(dynamic_cast<WMLRoot *>(foundGlyph))
            return TAG_WML;
    }

    throw FatalParsingError(FatalParsingError::kRootUndefined);
}


bool
WBXMLParser::text_run(ULong &pos)
{
    ULong length;

    CharPtr string;

    bool done = false;

    try
    {
        string = parseString(pos, &length, mCurrTextBufferLen == 0);

        done = true;
    }
    catch(UnexpectedEOF eof)
    {
        length = eof.mPos - pos;

        mPos = pos = eof.mPos - 1;

        if(mCurrTextBuffer == NULL)
            mCurrTextBuffer = (CharPtr) eof.mData;
```

```
        mCurrTextBufferLen += length;

        return false;
    }

    if((mCurrTextBufferLen > 0) && (mCurrTextBuffer != NULL))
    {
        string = mCurrTextBuffer;
        length += mCurrTextBufferLen;
    }

    if(length > 0)
    {
        new WMLTextRun( mGlyphStack.getLastElement(),
                        string,
                        (int) length,
                        mCurrentTextState);
    }

    mCurrTextBuffer = NULL;
    mCurrTextBufferLen = 0;

    return true;
}


void
WBXMLParser::unknown_tag(ULong &pos)
{
    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);
        } while(token != TOK_END);
    }

    if(!hasContent(mCurrentToken))
        return;

    mGlyphStack.add(mGlyphStack.getLastElement());
    mStateStack.add(mCurrentTextState);
}



void
WBXMLParser::tag_a(ULong &pos)
{
    WMLHyperlink link;

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_HREF:
                case ATTR_HREF_HTTP:
                case ATTR_HREF_HTTPS:
                    link.mHref = parseURL(--pos);
                    break;
            }
        } while(token != TOK_END);
    }

    if(!hasContent(mCurrentToken))
        return;

    WMLHyperlink * linkP = new WMLHyperlink(link);
    mCurrentTextState.action = linkP;
```

```
    mCurrentTextState.underline = grayUnderline;

    mGlyphStack.add(mGlyphStack.getLastElement());
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_td(ULong &/*pos*/)
{
    if(!hasContent(mCurrentToken))
        return;

    WMLTableCell * cell = new WMLTableCell(mGlyphStack.getLastElement());

    mGlyphStack.add((WMLParagraph*) cell);
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_tr(ULong &/*pos*/)
{
    if(!hasContent(mCurrentToken))
        return;

    WMLTableRow * row = new WMLTableRow(mGlyphStack.getLastElement());

    mGlyphStack.add(row);
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_table(ULong &pos)
{
    WMLTable table;

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_COLUNMNS:
                    table.mNumColumns = (int) StrAToI(parseString(pos));
                    break;

                case ATTR_ALIGN:
                    table.mAlignArray = parseString(pos);
                    break;

                case ATTR_TITLE:
                    table.mTitle = parseString(pos);
                    break;
            }
        } while(token != TOK_END);
    }

    if(!hasContent(mCurrentToken))
        return;

    sOpenTables++;

    WMLTable * tableP = new WMLTable(mGlyphStack.getLastElement(), table);

    mGlyphStack.add(tableP);
    mStateStack.add(mCurrentTextState);
}


void
```

```
WBXMLParser::tag_p(ULong &pos)
{
    WMLParagraph paragraph;

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_MODE_WRAP:
                    paragraph.bits.mIsWrapOn = true;
                    break;

                case ATTR_MODE_NOWRAP:
                    paragraph.bits.mIsWrapOn = false;
                    break;

                case ATTR_ALIGN_LEFT:
                    paragraph.mAlign = BLGlyph::kLeft;
                    break;

                case ATTR_ALIGN_RIGHT:
                    paragraph.mAlign = BLGlyph::kRight;
                    break;

                case ATTR_ALIGN_CENTER:
                    paragraph.mAlign = BLGlyph::kCenter;
                    break;
            }
        } while(token != TOK_END);
    }

    if(!hasContent(mCurrentToken))
        return;

    WMLParagraph * paragraphP = new WMLParagraph(mGlyphStack.getLastElement(), paragraph);
    mGlyphStack.add(paragraphP);

    mCurrentTextState.bits.wordWrap = paragraph.bits.mIsWrapOn;
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_postfield(ULong &pos)
{
    WMLPostfield    postfield;

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_NAME:
                    postfield.mName = parseString(pos);
                    break;

                case ATTR_VALUE:
                    postfield.mValue = parseString(pos);
                    break;
            }
        } while(token != TOK_END);
    }

    if(hasContent(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kUnexpectedContent);
```

```
    WMLPostfield * postfieldP = new WMLPostfield(mGlyphStack.getLastElement(), postfield);


void
WBXMLParser::tag_anchor(ULong &pos)
{
    WMLAnchor anchor;

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_TITLE:
                    anchor.mTitle = parseString(pos);
                    break;

                case ATTR_ACCESS_KEY:
                    anchor.mAccessKey = parseString(pos);
                    break;
            }
        } while(token != TOK_END);
    }

    if(!hasContent(mCurrentToken))
        return;

    WMLAnchor * anchorP = new WMLAnchor(mGlyphStack.getLastElement(), anchor);

    mCurrentTextState.action = anchorP;
    mCurrentTextState.underline = grayUnderline;

    mGlyphStack.add(anchorP);
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_access(ULong &pos)
{
    if(mRoot == NULL)
        throw FatalParsingError(FatalParsingError::kRootUndefined);

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_DOMAIN:
                    mRoot->mDomainAccess = parseString(pos);
                    break;

                case ATTR_PATH:
                    mRoot->mPathAccess = parseString(pos);
                    break;
            }
        } while(token != TOK_END);
    }

    if(hasContent(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kUnexpectedContent);
}


void
WBXMLParser::tag_big(ULong &/*pos*/)
```

```
{
    mCurrentTextState.bits.big = true;

    if(hasAttribute(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kUnexpectedAttribute);

    mGlyphStack.add(mGlyphStack.getLastElement());
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_br(ULong &/*pos*/)
{
    new WMLBreak(mGlyphStack.getLastElement());

    if(hasContent(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kUnexpectedContent);
}


void
WBXMLParser::tag_card(ULong &pos)
{
    if(mRoot == NULL)
        throw FatalParsingError(FatalParsingError::kRootUndefined);

    WMLCard card;

    WMLAttr attr = (WMLAttr) 0x0;
    CharPtr attrString = NULL;

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_ID:
                    card.mID = parseString(pos);
                    break;

                case ATTR_TITLE:
                    card.mTitle = parseString(pos);
                    break;

                case ATTR_NEWCONTEXT_TRUE:
                    card.mNewContext = true;
                    break;

                case ATTR_NEWCONTEXT_FALSE:
                    card.mNewContext = false;
                    break;

                case ATTR_ORDERED_TRUE:
                    card.mIsOrdered = true;
                    break;

                case ATTR_ORDERED_FALSE:
                    card.mIsOrdered = false;
                    break;

                case ATTR_ONENTERBACKWARD:
                case ATTR_ONENTERFORWARD:
                case ATTR_ONTIMER:
                    attr = (WMLAttr) token;
                    attrString = parseURL(pos);
                    break;
            }
        } while(token != TOK_END);
    }
```

```
    if(!hasContent(mCurrentToken))
        return;

    WMLCard * cardP = new WMLCard(mGlyphStack.getLastElement(), card, mRoot);

    if(mRoot->mTemplate)
        cardP->mEvents = mRoot->mTemplate->mEvents;

    if(attr != 0x0)
    {
        WMLHyperlink * link = new WMLHyperlink(attrString);

        switch(attr)
        {
            case ATTR_ONENTERBACKWARD:
            case ATTR_TYPE_ONENTERBACKWARD:
                cardP->mEvents.mOnEnterBackward = link;
                break;

            case ATTR_ONENTERFORWARD:
            case ATTR_TYPE_ONENTERFORWARD:
                cardP->mEvents.mOnEnterForward = link;
                break;

            case ATTR_ONTIMER:
            case ATTR_TYPE_ONTIMER:
                cardP->mEvents.mOnTimer = link;
                break;
        }
    }

    mGlyphStack.add(cardP);
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_do(ULong &pos)
{
    WMLDo doElem;

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_TYPE:
                    parseString(pos);
                    doElem.mType = WMLDo::kUnknown;
                    break;

                case ATTR_TYPE_ACCEPT:
                    doElem.mType = WMLDo::kAccept;
                    break;

                case ATTR_TYPE_PREV:
                    doElem.mType = WMLDo::kPrev;
                    break;

                case ATTR_TYPE_HELP:
                    doElem.mType = WMLDo::kHelp;
                    break;

                case ATTR_TYPE_RESET:
                    doElem.mType = WMLDo::kReset;
                    break;

                case ATTR_TYPE_OPTIONS:
                    doElem.mType = WMLDo::kOptions;
                    break;
```

```
            case ATTR_TYPE_DELETE:
                doElem.mType = WMLDo::kDelete;
                break;

            case ATTR_LABEL:
                doElem.mLabel = parseString(pos);
                break;

            case ATTR_NAME:
                doElem.mName = parseString(pos);
                break;

            case ATTR_OPTIONAL_FALSE:
                doElem.mIsOptional = false;
                break;

            case ATTR_OPTIONAL_TRUE:
                doElem.mIsOptional = true;
                break;
            }
        } while(token != TOK_END);
    }

    if(!hasContent(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kContentExpected);

    if( (doElem.mLabel == NULL) &&
        ((doElem.mType >= WMLDo::kUnknown) && (doElem.mType <= WMLDo::kDelete)))
    {
        doElem.mLabel = kTypeStrings[doElem.mType];
    }

    WMLDo * doP = new WMLDo(mGlyphStack.getLastElement(), doElem);

    BLGlyph * enclosingGlyph = NULL;

    mCurrentTextState.action = doP;

    switch(getEnclosingContext(enclosingGlyph))
    {
        case TAG_CARD:
            dynamic_cast<WMLCard *>(enclosingGlyph)->addAction(doP);
            break;

        case TAG_TEMPLATE:
        case TAG_WML:
            mRoot->addAction(doP);
            break;

        case TAG_P:
            CharPtr itemName = doP->mLabel;

            if(itemName == NULL)
                itemName = "Unknown Action";

            WMLButton * buttonP = new WMLButton(mGlyphStack.getLastElement(),
                                                itemName,
                                                (int) StrLen(itemName),
                                                mCurrentTextState);

            break;

        case TAG_HEAD:
            break;
    }

    mGlyphStack.add(doP);
    mStateStack.add(mCurrentTextState);
}

void
WBXMLParser::tag_em(ULong &/*pos*/)
{
    mCurrentTextState.bits.emphasis = true;
```

```
    if(hasAttribute(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kUnexpectedAttribute);

    mGlyphStack.add(mGlyphStack.getLastElement());
    mStateStack.add(mCurrentTextState);
}

void
WBXMLParser::tag_fieldset(ULong &pos)
{
    // page 52

    WMLFieldSet fieldset;

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_TITLE:
                    fieldset.mTitle = parseString(pos);
                    break;
            }
        } while(token != TOK_END);
    }

    WMLFieldSet * fieldsetP = new WMLFieldSet(mGlyphStack.getLastElement(), fieldset);
}

void
WBXMLParser::tag_go(ULong &pos)
{
    WMLGo go;

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_HREF:
                case ATTR_HREF_HTTP:
                case ATTR_HREF_HTTPS:
                    go.mHref = parseURL(--pos);
                    break;

                case ATTR_SENDREFERER_FALSE:
                    go.mSendReferer = false;
                    break;

                case ATTR_SENDREFERER_TRUE:
                    go.mSendReferer = true;
                    break;

                case ATTR_METHOD_GET:
                    go.mMethod = WMLGo::kGet;
                    break;

                case ATTR_METHOD_POST:
                    go.mMethod = WMLGo::kPost;
                    break;

                case ATTR_ACCEPT_CHARSET:
                    go.mEncodingType = parseString(pos);
                    break;
            }
```

```
        } while(token != TOK_END);
    }

    WMLGo * goP = new WMLGo(mGlyphStack.getLastElement(), go);

    if(mCurrentTextState.action)
        mCurrentTextState.action->setAction(goP);

    if(!hasContent(mCurrentToken))
        return;

    mGlyphStack.add(goP);
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_head(ULong &pos)
{
    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);
        } while(token != TOK_END);
    }

    if(!hasContent(mCurrentToken))
        return;

    WMLHead * head = new WMLHead(mGlyphStack.getLastElement());

    mGlyphStack.add(head);
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_img(ULong &pos)
{
    WMLImage image(mCurrentTextState);

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_SRC:
                case ATTR_SRC_HTTP:
                case ATTR_SRC_HTTPS:
                    image.mSrc = parseURL(--pos);
                    break;

                case ATTR_HEIGHT:
                    parseString(pos);   // ignore, for now
                    break;

                case ATTR_WIDTH:
                    parseString(pos);   // ignore, for now
                    break;

                case ATTR_ALT:
                    image.mAltText = parseString(pos);
                    break;

                case ATTR_VSPACE:
                    image.mSpace.y = (Short) StrAToI(parseString(pos));
                    break;

                case ATTR_HSPACE:
```

```
                    image.mSpace.x = (Short) StrAToI(parseString(pos));
                    break;
                case ATTR_ALIGN_BOTTOM:
                    image.mAlign = BLGlyph::kBottom;
                    break;

                case ATTR_ALIGN_CENTER:
                    image.mAlign = BLGlyph::kCenter;
                    break;

                case ATTR_ALIGN_LEFT:
                    image.mAlign = BLGlyph::kLeft;
                    break;

                case ATTR_ALIGN_MIDDLE:
                    image.mAlign = BLGlyph::kMiddle;
                    break;

                case ATTR_ALIGN_RIGHT:
                    image.mAlign = BLGlyph::kRight;
                    break;

                case ATTR_ALIGN_TOP:
                    image.mAlign = BLGlyph::kTop;
                    break;
            }
        } while(token != TOK_END);
    }

    BLGlyph * foundGlyph;

    if(getEnclosingContext(foundGlyph) == TAG_P)
        image.mParentParagraph = dynamic_cast<WMLParagraph *>(foundGlyph);

    mImages.add(new WMLImage(mGlyphStack.getLastElement(), image));

    if(hasContent(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kUnexpectedContent);
}


void
WBXMLParser::tag_input(ULong &pos)
{
    // page 50

    WMLInput input;

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_NAME:
                    input.mName = parseString(pos);
                    break;

                case ATTR_VALUE:
                    input.mValue = parseString(pos);
                    break;

                case ATTR_TITLE:
                    input.mTitle = parseString(pos);
                    break;

                case ATTR_ACCESS_KEY:
                    input.mAccessKey = parseString(pos);
                    break;

                case ATTR_FORMAT:
```

```
                input.mFormat = parseString(pos);
                break;

            case ATTR_SIZE:
                input.mSize = (int) StrAToI(parseString(pos));
                break;

            case ATTR_MAXLENGTH:
                input.mMaxLength = (int) StrAToI(parseString(pos));
                break;

            case ATTR_TABINDEX:
                input.mTabIndex = (int) StrAToI(parseString(pos));
                break;

            case ATTR_TYPE_TEXT:
                input.mType = WMLInput::kText;
                break;

            case ATTR_TYPE_PASSWORD:
                input.mType = WMLInput::kPassword;
                break;

            case ATTR_EMPTYTOK_FALSE:
                input.mEmptytok = false;
                break;

            case ATTR_EMPTYTOK_TRUE:
                input.mEmptytok = true;
                break;
            }
        } while(token != TOK_END);
    }

    if(hasContent(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kUnexpectedContent);

    WMLInput * inputP = new WMLInput(mGlyphStack.getLastElement(), input);
}


void
WBXMLParser::tag_meta(ULong &pos)
{
    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_HTTP_EQUIV:
                case ATTR_HTTP_EQUIV_CONTENT_TYPE:
                case ATTR_HTTP_EQUIV_EXPIRES:
                    parseString(pos);
                    break;

                case ATTR_NAME:
                    parseString(pos);
                    break;

                case ATTR_FORUA_FALSE:
                case ATTR_FORUA_TRUE:
                    break;

                case ATTR_CONTENT:
                    parseString(pos);
                    break;

                case ATTR_SCHEME:
                    parseString(pos);
                    break;
            }
```

```
        } while(token != TOK_END);
    }
    if(hasContent(mCurrentToken))
    {
        mGlyphStack.add(mGlyphStack.getLastElement());
        mStateStack.add(mCurrentTextState);
    }
}


void
WBXMLParser::tag_noop(ULong &/*pos*/)
{
    if(hasAttribute(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kUnexpectedAttribute);

    if(hasContent(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kUnexpectedContent);

    if(mCurrentTextState.action)
        mCurrentTextState.action->setAction(NULL);
}


void
WBXMLParser::tag_prev(ULong &/*pos*/)
{
    if(hasAttribute(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kUnexpectedAttribute);

    WMLPrevious * previous = new WMLPrevious(mGlyphStack.getLastElement());

    if(mCurrentTextState.action)
        mCurrentTextState.action->setAction(previous);

    if(!hasContent(mCurrentToken))
        return;

    mGlyphStack.add(previous);
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_onevent(ULong &pos)
{
    WMLAttr attr = (WMLAttr) 0x0;

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_TYPE:
                    parseString(pos);
                    // unknown value
                    break;

                case ATTR_TYPE_ACCEPT:
                case ATTR_TYPE_DELETE:
                case ATTR_TYPE_HELP:
                case ATTR_TYPE_PASSWORD:
                case ATTR_TYPE_ONPICK:
                case ATTR_TYPE_ONENTERBACKWARD:
                case ATTR_TYPE_ONENTERFORWARD:
                case ATTR_TYPE_ONTIMER:
                case ATTR_ONENTERBACKWARD:
                case ATTR_ONENTERFORWARD:
                case ATTR_ONTIMER:
                case ATTR_ONPICK:
```

```
                attr = (WMLAttr) token;
                break;
            }
        } while(token != TOK_END);
    }

    if(!hasContent(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kContentExpected);

    BLGlyph * foundGlyph;
    WMLIntrinsicEvents * eventsP = NULL;

    switch(getEnclosingContext(foundGlyph))
    {
        case TAG_TEMPLATE:
            eventsP = &dynamic_cast<WMLTemplate *>(foundGlyph)->getIntrinsicEvents();
            break;

        case TAG_CARD:
            eventsP = &dynamic_cast<WMLCard *>(foundGlyph)->getIntrinsicEvents();
            break;

        case TAG_OPTION:
            // !!! Fill in later.
        default:
            break;
    }

    WMLOnEvent * onevent = new WMLOnEvent(mGlyphStack.getLastElement());

    if((attr != 0x0) && eventsP)
    {
        switch(attr)
        {
            case ATTR_ONENTERBACKWARD:
            case ATTR_TYPE_ONENTERBACKWARD:
                eventsP->mOnEnterBackward = onevent;
                break;

            case ATTR_ONENTERFORWARD:
            case ATTR_TYPE_ONENTERFORWARD:
                eventsP->mOnEnterForward = onevent;
                break;

            case ATTR_ONTIMER:
            case ATTR_TYPE_ONTIMER:
                eventsP->mOnTimer = onevent;
                break;

            case ATTR_ONPICK:
            case ATTR_TYPE_ONPICK:
                eventsP->mOnPick = onevent;
                break;
        }
    }

    mCurrentTextState.action = onevent;

    mGlyphStack.add(onevent);
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_optgroup(ULong &pos)
{
    // page 47

    WMLOptgroup optgroup;

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
```

```
            token = parseByte(pos);
            switch(token)
            {
                case ATTR_TITLE:
                    optgroup.mTitle = parseString(pos);
                    break;
            }
        } while(token != TOK_END);
    }

    if(!hasContent(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kContentExpected);

//  Don't add for now.
//  WMLOptgroup * optgroupP = new WMLOptgroup(mGlyphStack.getLastElement(), optgroup);
//  mGlyphStack.add(optgroupP);

    mGlyphStack.add(mGlyphStack.getLastElement());
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_option(ULong &pos)
{
    // page 46

    WMLOption option(mCurrSelectP);

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_TITLE:
                    option.mTitle = parseString(pos);
                    break;

                case ATTR_VALUE:
                    option.mValue = parseString(pos);
                    break;

                case ATTR_ONPICK:
                    option.mOnPick = parseURL(pos);
                    break;
            }
        } while(token != TOK_END);
    }

    if(!hasContent(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kContentExpected);

    mCurrSelectP->incrementOptionCount();

    WMLOption * optionP = new WMLOption(mGlyphStack.getLastElement(), option);

    if(optionP->mOnPick)
    {
    //  !!! we could make the text clickable too....
    //  mCurrentTextState.action = optionP;
    //  mCurrentTextState.underline = grayUnderline;
    }

    mGlyphStack.add((BLParentGlyph *) optionP);
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_refresh(ULong &/*pos*/)
```

```
{
    if(hasAttribute(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kUnexpectedAttribute);

    WMLRefresh * refresh = new WMLRefresh(mGlyphStack.getLastElement());

    if(mCurrentTextState.action)
        mCurrentTextState.action->setAction(refresh);

    if(!hasContent(mCurrentToken))
        return;

    mGlyphStack.add(refresh);
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_select(ULong &pos)
{
    // page 44

    WMLSelect select;

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_TITLE:
                    select.mTitle = parseString(pos);
                    break;

                case ATTR_NAME:
                    select.mName = parseString(pos);
                    break;

                case ATTR_VALUE:
                    select.mValue = parseString(pos);
                    break;

                case ATTR_INAME:
                    select.mIName = parseString(pos);
                    break;

                case ATTR_IVALUE:
                    select.mIValue = parseString(pos);
                    break;

                case ATTR_TABINDEX:
                    select.mTabIndex = (int) StrAToI(parseString(pos));
                    break;

                case ATTR_MULTIPLE_TRUE:
                    select.mType = WMLSelect::kCheckboxes;
                    break;

                case ATTR_MULTIPLE_FALSE:
                    select.mType = WMLSelect::kRadioButtons;
                    break;
            }
        } while(token != TOK_END);
    }

    if(!hasContent(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kContentExpected);

    // !!! TEMP CHANGE !!!
    select.mType = WMLSelect::kPopupList;

    mCurrSelectP = new WMLSelect(mGlyphStack.getLastElement(), select);
```

```
    mGlyphStack.add((BLParentGlyph *) mCurrSelectP);
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_small(ULong &/*pos*/)
{
    mCurrentTextState.bits.small = true;

    if(hasAttribute(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kUnexpectedAttribute);

    mGlyphStack.add(mGlyphStack.getLastElement());
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_strong(ULong &/*pos*/)
{
    mCurrentTextState.bits.strong = true;

    if(hasAttribute(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kUnexpectedAttribute);

    mGlyphStack.add(mGlyphStack.getLastElement());
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_template(ULong &pos)
{
    if(mRoot == NULL)
        throw FatalParsingError(FatalParsingError::kRootUndefined);

    WMLIntrinsicEvents events;
    CharPtr string;

    // !!! this leaks memory if we reach end of buffer in the middle
    //     of this. So make sure WMLHyperlink isn't too big.
    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_ONENTERFORWARD:
                    string = parseString(pos);
                    events.mOnEnterForward = new WMLHyperlink(string);
                    break;

                case ATTR_ONENTERBACKWARD:
                    string = parseString(pos);
                    events.mOnEnterBackward = new WMLHyperlink(string);
                    break;

                case ATTR_ONTIMER:
                    string = parseString(pos);
                    events.mOnTimer = new WMLHyperlink(string);
                    break;
            }
        } while(token != TOK_END);
    }

    WMLTemplate * templateP = new WMLTemplate(mGlyphStack.getLastElement());

    templateP->mEvents = events;

    mRoot->mTemplate = templateP;
```

```
    mGlyphStack.add(templateP);
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_timer(ULong &pos)
{
    ULong value = 0;

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_VALUE:
                    value = (ULong) StrAToI(parseString(pos));
                    break;
            }

        } while(token != TOK_END);
    }

    if(hasContent(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kUnexpectedContent);

    BLGlyph * foundGlyph;
    if(getEnclosingContext(foundGlyph) == TAG_CARD)
    {
        WMLTimer * timer = new WMLTimer(dynamic_cast<WMLCard *>(foundGlyph),
                                        value);

    }
}


void
WBXMLParser::tag_u(ULong &/*pos*/)
{
    mCurrentTextState.underline = solidUnderline;

    if(hasAttribute(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kUnexpectedAttribute);

    mGlyphStack.add(mGlyphStack.getLastElement());
    mStateStack.add(mCurrentTextState);
}


void
WBXMLParser::tag_setvar(ULong &pos)
{
    // page 20

    WMLSetvar   setvar;

    if(hasAttribute(mCurrentToken))
    {
        Byte token;

        do {
            token = parseByte(pos);

            switch(token)
            {
                case ATTR_NAME:
                    setvar.mName = parseString(pos);
                    break;

                case ATTR_VALUE:
                    setvar.mValue = parseString(pos);
```

```
                    break;
            }
        } while(token != TOK_END);
    }

    if(hasContent(mCurrentToken))
        throw FatalParsingError(FatalParsingError::kUnexpectedContent);

    WMLSetvar * setvarP = new WMLSetvar(mGlyphStack.getLastElement(), setvar);
}


void
WBXMLParser::tag_wml(ULong &/*pos*/)
{
    mRoot = new WMLRoot();

    mGlyphStack.add(mRoot);
    mStateStack.add(mCurrentTextState);
}


// WBXMLParser.h

#pragma once

#include "XMLParser.h"
#include "BLTypes.h"
#include "BLGlyph.h"
#include "WMLState.h"
#include "WBXMLConstants.h"
#include "BLWMLInput.h"

class UnexpectedEOF
{
    public:
        UnexpectedEOF(ULong pos = 0, VoidPtr dataP = NULL) { mPos = pos; mData = dataP; }

        ULong mPos;
        VoidPtr mData;
};


class FatalParsingError
{
    public:

        enum FatalCode {    kUnknownError = 0,
                            kFileTypeError,
                            kRootUndefined,
                            kUnexpectedContent,
                            kUnexpectedAttribute,
                            kUnexpectedEndOfStack,
                            kContentExpected };

        FatalParsingError(FatalCode code) { mCode = code; }

        FatalCode mCode;
};

class TopItem : public BLGlyph
{
};

class WBXMLParser : public XMLParser
{
    public:

                            WBXMLParser();
                            ~WBXMLParser();

        virtual ULong   readData(CharPtr buffer, ULong length);

                WMLRoot *   getRoot() { return mRoot; }
```

```
    // !!! These don't _really_ need to be static. This is just the
    //     easiest way for flow() to get to these.
    static  BLGlyph *      sGetCurrentNode() { return sCurrentGlyph; }
    static  int            sGetNumOpenTables() { return sOpenTables; }

    BLVector<WMLImage *, BLGlyph::kChildrenInc>& getImages() { return mImages; }

protected:

    void setCurrGlyph();

    WMLTagToken getEnclosingContext(BLGlyph * &foundGlyph);

    ULong    parseMultibyteInt(ULong &pos);
    Byte     parseByte(       ULong &pos);
    CharPtr  parseString(     ULong &pos, ULong * lengthP = NULL, bool parseType = true);
    CharPtr  parseURL(        ULong &pos);
    ULong    stringLength(    ULong &pos);
    void     parseHeader(     ULong &pos);

    bool     hasAttribute(    Byte token) { return (token & 0x80) != 0; }
    bool     hasContent(      Byte token) { return (token & 0x40) != 0; }

    bool     text_run(        ULong &pos);
    void     unknown_tag(     ULong &pos);

    void     tag_a(           ULong &pos);
    void     tag_td(          ULong &pos);
    void     tag_tr(          ULong &pos);
    void     tag_table(       ULong &pos);

    void     tag_p(           ULong &pos);
    void     tag_postfield(   ULong &pos);
    void     tag_anchor(      ULong &pos);
    void     tag_access(      ULong &pos);
    void     tag_big(         ULong &pos);
    void     tag_br(          ULong &pos);
    void     tag_card(        ULong &pos);
    void     tag_do(          ULong &pos);
    void     tag_em(          ULong &pos);
    void     tag_fieldset(    ULong &pos);
    void     tag_go(          ULong &pos);
    void     tag_head(        ULong &pos);
    void     tag_img(         ULong &pos);
    void     tag_input(       ULong &pos);

    void     tag_meta(        ULong &pos);
    void     tag_noop(        ULong &pos);
    void     tag_prev(        ULong &pos);
    void     tag_onevent(     ULong &pos);
    void     tag_optgroup(    ULong &pos);
    void     tag_option(      ULong &pos);
    void     tag_refresh(     ULong &pos);
    void     tag_select(      ULong &pos);
    void     tag_small(       ULong &pos);
    void     tag_strong(      ULong &pos);

    void     tag_template(    ULong &pos);
    void     tag_timer(       ULong &pos);
    void     tag_u(           ULong &pos);
    void     tag_setvar(      ULong &pos);
    void     tag_wml(         ULong &pos);

    ULong    mPublicID;
    Byte     mID_Index;
    CharPtr  mStringTable;
    ULong    mCharSet;
    ULong    mStringTableLen;
    CharPtr  mBuffer;
    ULong    mPos;
    ULong    mLength;

    Byte          mCurrentToken;
    TextState     mCurrentTextState;
    BLVector<BLGlyph *, BLGlyph::kChildrenInc> mGlyphStack;
```

```
    BLVector<TextState, BLGlyph::kChildrenInc> mStateStack;
    BLVector<WMLImage *, BLGlyph::kChildrenInc>    mImages;

    bool     mHeaderDone;

    CharPtr          mCurrTextBuffer;
    ULong            mCurrTextBufferLen;

    WMLSelect   *   mCurrSelectP;

    static  BLGlyph *    sCurrentGlyph;
    static  int          sOpenTables;
};

typedef void (WBXMLParser::*TagHandlerType)(ULong &pos);<?xml version="1.0"?>
<?codewarrior exportversion="1.0" ideversion="4.0"?>
<!DOCTYPE PROJECT [

<!ELEMENT PROJECT (TARGETLIST, TARGETORDER, GROUPLIST, DESIGNLIST?)>
<!ELEMENT TARGETLIST (TARGET+)>
<!ELEMENT TARGET (NAME, SETTINGLIST, FILELIST?, LINKORDER?, SEGMENTLIST?, OVERLAYGROUPLIST?,
SUBTARGETLIST?, SUBPROJECTLIST?)>
<!ELEMENT NAME (#PCDATA)>
<!ELEMENT USERSOURCETREETYPE (#PCDATA)>
<!ELEMENT PATH (#PCDATA)>
<!ELEMENT FILELIST (FILE*)>
<!ELEMENT FILE (PATHTYPE, PATHROOT?, ACCESSPATH?, PATH, PATHFORMAT?, ROOTFILEREF?,
FILEKIND?, FILEFLAGS?)>
<!ELEMENT PATHTYPE (#PCDATA)>
<!ELEMENT PATHROOT (#PCDATA)>
<!ELEMENT ACCESSPATH (#PCDATA)>
<!ELEMENT PATHFORMAT (#PCDATA)>
<!ELEMENT ROOTFILEREF (PATHTYPE, PATHROOT?, ACCESSPATH?, PATH, PATHFORMAT?)>
<!ELEMENT FILEKIND (#PCDATA)>
<!ELEMENT FILEFLAGS (#PCDATA)>
<!ELEMENT FILEREF (TARGETNAME?, PATHTYPE, PATHROOT?, ACCESSPATH?, PATH, PATHFORMAT?)>
<!ELEMENT TARGETNAME (#PCDATA)>
<!ELEMENT SETTINGLIST ((SETTING|PANELDATA)+)>
<!ELEMENT SETTING (NAME?, (VALUE|(SETTING+)))>
<!ELEMENT PANELDATA (NAME, VALUE)>
<!ELEMENT VALUE (#PCDATA)>
<!ELEMENT LINKORDER (FILEREF*)>
<!ELEMENT SEGMENTLIST (SEGMENT+)>
<!ELEMENT SEGMENT (NAME, ATTRIBUTES?, FILEREF*)>
<!ELEMENT ATTRIBUTES (#PCDATA)>
<!ELEMENT OVERLAYGROUPLIST (OVERLAYGROUP+)>
<!ELEMENT OVERLAYGROUP (NAME, BASEADDRESS, OVERLAY*)>
<!ELEMENT BASEADDRESS (#PCDATA)>
<!ELEMENT OVERLAY (NAME, FILEREF*)>
<!ELEMENT SUBTARGETLIST (SUBTARGET+)>
<!ELEMENT SUBTARGET (TARGETNAME, ATTRIBUTES?)>
<!ELEMENT SUBPROJECTLIST (SUBPROJECT+)>
<!ELEMENT SUBPROJECT (FILEREF, SUBPROJECTTARGETLIST)>
<!ELEMENT SUBPROJECTTARGETLIST (SUBPROJECTTARGET*)>
<!ELEMENT SUBPROJECTTARGET (TARGETNAME, ATTRIBUTES?)>
<!ELEMENT TARGETORDER (ORDEREDTARGET|ORDEREDDESIGN)*>
<!ELEMENT ORDEREDTARGET (NAME)>
<!ELEMENT ORDEREDDESIGN (NAME, ORDEREDTARGET+)>
<!ELEMENT GROUPLIST (GROUP|FILEREF)*>
<!ELEMENT GROUP (NAME, (GROUP|FILEREF)*)>
<!ELEMENT DESIGNLIST (DESIGN+)>
<!ELEMENT DESIGN (NAME, DESIGNDATA)>
<!ELEMENT DESIGNDATA (#PCDATA)>
]>
<PROJECT>
    <TARGETLIST>
        <TARGET>
            <NAME>Blazer</NAME>
            <SETTINGLIST>

                <!-- Settings for "Source Trees" panel -->
                <SETTING><NAME>UserSourceTrees</NAME><VALUE></VALUE></SETTING>

                <!-- Settings for "Custom Keywords" panel -->
```

```
        <SETTING><NAME>CustomColor1</NAME>
            <SETTING><NAME>Red</NAME><VALUE>0</VALUE></SETTING>
            <SETTING><NAME>Green</NAME><VALUE>32767</VALUE></SETTING>
            <SETTING><NAME>Blue</NAME><VALUE>0</VALUE></SETTING>
        </SETTING>
        <SETTING><NAME>CustomColor2</NAME>
            <SETTING><NAME>Red</NAME><VALUE>0</VALUE></SETTING>
            <SETTING><NAME>Green</NAME><VALUE>32767</VALUE></SETTING>
            <SETTING><NAME>Blue</NAME><VALUE>0</VALUE></SETTING>
        </SETTING>
        <SETTING><NAME>CustomColor3</NAME>
            <SETTING><NAME>Red</NAME><VALUE>0</VALUE></SETTING>
            <SETTING><NAME>Green</NAME><VALUE>32767</VALUE></SETTING>
            <SETTING><NAME>Blue</NAME><VALUE>0</VALUE></SETTING>
        </SETTING>
        <SETTING><NAME>CustomColor4</NAME>
            <SETTING><NAME>Red</NAME><VALUE>0</VALUE></SETTING>
            <SETTING><NAME>Green</NAME><VALUE>32767</VALUE></SETTING>
            <SETTING><NAME>Blue</NAME><VALUE>0</VALUE></SETTING>
        </SETTING>

        <!-- Settings for "Access Paths" panel -->
        <SETTING><NAME>AlwaysSearchUserPaths</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>InterpretDOSAndUnixPaths</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>UserSearchPaths</NAME>
            <SETTING>
                <SETTING><NAME>SearchPath</NAME>
                    <SETTING><NAME>Path</NAME><VALUE>:</VALUE></SETTING>
                    <SETTING><NAME>PathFormat</NAME><VALUE>MacOS</VALUE></SETTING>
                    <SETTING><NAME>PathRoot</NAME><VALUE>Project</VALUE></SETTING>
                </SETTING>
                <SETTING><NAME>Recursive</NAME><VALUE>true</VALUE></SETTING>
                <SETTING><NAME>HostFlags</NAME><VALUE>All</VALUE></SETTING>
            </SETTING>
        </SETTING>
        <SETTING><NAME>SystemSearchPaths</NAME>
            <SETTING>
                <SETTING><NAME>SearchPath</NAME>
                    <SETTING><NAME>Path</NAME><VALUE>Palm OS 3.1
Support\Incs</VALUE></SETTING>
                    <SETTING><NAME>PathFormat</NAME><VALUE>Windows</VALUE></SETTING>

<SETTING><NAME>PathRoot</NAME><VALUE>CodeWarrior</VALUE></SETTING>
                </SETTING>
                <SETTING><NAME>Recursive</NAME><VALUE>true</VALUE></SETTING>
                <SETTING><NAME>HostFlags</NAME><VALUE>All</VALUE></SETTING>
            </SETTING>
            <SETTING>
                <SETTING><NAME>SearchPath</NAME>

<SETTING><NAME>Path</NAME><VALUE>MSL\MSL_C\MSL_Common</VALUE></SETTING>
                    <SETTING><NAME>PathFormat</NAME><VALUE>Windows</VALUE></SETTING>

<SETTING><NAME>PathRoot</NAME><VALUE>CodeWarrior</VALUE></SETTING>
                </SETTING>
                <SETTING><NAME>Recursive</NAME><VALUE>true</VALUE></SETTING>
                <SETTING><NAME>HostFlags</NAME><VALUE>All</VALUE></SETTING>
            </SETTING>
            <SETTING>
                <SETTING><NAME>SearchPath</NAME>

<SETTING><NAME>Path</NAME><VALUE>MSL\MSL_C\MSL_MacOS</VALUE></SETTING>
                    <SETTING><NAME>PathFormat</NAME><VALUE>Windows</VALUE></SETTING>

<SETTING><NAME>PathRoot</NAME><VALUE>CodeWarrior</VALUE></SETTING>
                </SETTING>
                <SETTING><NAME>Recursive</NAME><VALUE>true</VALUE></SETTING>
                <SETTING><NAME>HostFlags</NAME><VALUE>All</VALUE></SETTING>
            </SETTING>
            <SETTING>
                <SETTING><NAME>SearchPath</NAME>

<SETTING><NAME>Path</NAME><VALUE>MSL\MSL_C++\MSL_Common\Include</VALUE></SETTING>
                    <SETTING><NAME>PathFormat</NAME><VALUE>Windows</VALUE></SETTING>
```

```
<SETTING><NAME>PathRoot</NAME><VALUE>CodeWarrior</VALUE></SETTING>
                </SETTING>
                <SETTING><NAME>Recursive</NAME><VALUE>true</VALUE></SETTING>
                <SETTING><NAME>HostFlags</NAME><VALUE>All</VALUE></SETTING>
            </SETTING>
            <SETTING>
                <SETTING><NAME>SearchPath</NAME>
                    <SETTING><NAME>Path</NAME><VALUE>Palm VII
Support\Incs\System</VALUE></SETTING>
                    <SETTING><NAME>PathFormat</NAME><VALUE>Windows</VALUE></SETTING>

<SETTING><NAME>PathRoot</NAME><VALUE>CodeWarrior</VALUE></SETTING>
                </SETTING>
                <SETTING><NAME>Recursive</NAME><VALUE>true</VALUE></SETTING>
                <SETTING><NAME>HostFlags</NAME><VALUE>All</VALUE></SETTING>
            </SETTING>
            <SETTING>
                <SETTING><NAME>SearchPath</NAME>
                    <SETTING><NAME>Path</NAME><VALUE>Palm OS 3.1
Support</VALUE></SETTING>
                    <SETTING><NAME>PathFormat</NAME><VALUE>Windows</VALUE></SETTING>

<SETTING><NAME>PathRoot</NAME><VALUE>CodeWarrior</VALUE></SETTING>
                </SETTING>
                <SETTING><NAME>Recursive</NAME><VALUE>true</VALUE></SETTING>
                <SETTING><NAME>HostFlags</NAME><VALUE>All</VALUE></SETTING>
            </SETTING>
        </SETTING>

        <!-- Settings for "Target Settings" panel -->
        <SETTING><NAME>Linker</NAME><VALUE>MacOS 68K Linker</VALUE></SETTING>
        <SETTING><NAME>PreLinker</NAME><VALUE></VALUE></SETTING>
        <SETTING><NAME>PostLinker</NAME><VALUE>PalmRez Post Linker</VALUE></SETTING>
        <SETTING><NAME>Targetname</NAME><VALUE>Blazer</VALUE></SETTING>
        <SETTING><NAME>OutputDirectory</NAME>
            <SETTING><NAME>Path</NAME><VALUE>:</VALUE></SETTING>
            <SETTING><NAME>PathFormat</NAME><VALUE>MacOS</VALUE></SETTING>
            <SETTING><NAME>PathRoot</NAME><VALUE>Project</VALUE></SETTING>
        </SETTING>

<SETTING><NAME>SaveEntriesUsingRelativePaths</NAME><VALUE>false</VALUE></SETTING>

        <!-- Settings for "File Mappings" panel -->
        <SETTING><NAME>FileMappings</NAME>
            <SETTING>
                <SETTING><NAME>FileType</NAME><VALUE>APPL</VALUE></SETTING>
                <SETTING><NAME>FileExtension</NAME><VALUE></VALUE></SETTING>
                <SETTING><NAME>Compiler</NAME><VALUE></VALUE></SETTING>
                <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
                <SETTING><NAME>Launchable</NAME><VALUE>true</VALUE></SETTING>
                <SETTING><NAME>ResourceFile</NAME><VALUE>true</VALUE></SETTING>
                <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
            </SETTING>
            <SETTING>
                <SETTING><NAME>FileType</NAME><VALUE>Appl</VALUE></SETTING>
                <SETTING><NAME>FileExtension</NAME><VALUE></VALUE></SETTING>
                <SETTING><NAME>Compiler</NAME><VALUE></VALUE></SETTING>
                <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
                <SETTING><NAME>Launchable</NAME><VALUE>true</VALUE></SETTING>
                <SETTING><NAME>ResourceFile</NAME><VALUE>true</VALUE></SETTING>
                <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
            </SETTING>
            <SETTING>
                <SETTING><NAME>FileType</NAME><VALUE>MMLB</VALUE></SETTING>
                <SETTING><NAME>FileExtension</NAME><VALUE></VALUE></SETTING>
                <SETTING><NAME>Compiler</NAME><VALUE>Lib Import
68K</VALUE></SETTING>
                <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
                <SETTING><NAME>Launchable</NAME><VALUE>false</VALUE></SETTING>
                <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
                <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
            </SETTING>
            <SETTING>
                <SETTING><NAME>FileType</NAME><VALUE>MPLF</VALUE></SETTING>
                <SETTING><NAME>FileExtension</NAME><VALUE></VALUE></SETTING>
```

```
        <SETTING><NAME>Compiler</NAME><VALUE>Lib Import
68K</VALUE></SETTING>
        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>Launchable</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
    </SETTING>
    <SETTING>
        <SETTING><NAME>FileType</NAME><VALUE>MWCD</VALUE></SETTING>
        <SETTING><NAME>FileExtension</NAME><VALUE></VALUE></SETTING>
        <SETTING><NAME>Compiler</NAME><VALUE></VALUE></SETTING>
        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>Launchable</NAME><VALUE>true</VALUE></SETTING>
        <SETTING><NAME>ResourceFile</NAME><VALUE>true</VALUE></SETTING>
        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
    </SETTING>
    <SETTING>
        <SETTING><NAME>FileType</NAME><VALUE>OBJ </VALUE></SETTING>
        <SETTING><NAME>FileExtension</NAME><VALUE></VALUE></SETTING>
        <SETTING><NAME>Compiler</NAME><VALUE>MPW Import
68K</VALUE></SETTING>
        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>Launchable</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
    </SETTING>
    <SETTING>
        <SETTING><NAME>FileType</NAME><VALUE>PLob</VALUE></SETTING>
        <SETTING><NAME>FileExtension</NAME><VALUE></VALUE></SETTING>
        <SETTING><NAME>Compiler</NAME><VALUE></VALUE></SETTING>
        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>Launchable</NAME><VALUE>true</VALUE></SETTING>
        <SETTING><NAME>ResourceFile</NAME><VALUE>true</VALUE></SETTING>
        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
    </SETTING>
    <SETTING>
        <SETTING><NAME>FileType</NAME><VALUE>RSRC</VALUE></SETTING>
        <SETTING><NAME>FileExtension</NAME><VALUE></VALUE></SETTING>
        <SETTING><NAME>Compiler</NAME><VALUE></VALUE></SETTING>
        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>Launchable</NAME><VALUE>true</VALUE></SETTING>
        <SETTING><NAME>ResourceFile</NAME><VALUE>true</VALUE></SETTING>
        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
    </SETTING>
    <SETTING>
        <SETTING><NAME>FileType</NAME><VALUE>TEXT</VALUE></SETTING>
        <SETTING><NAME>FileExtension</NAME><VALUE>.bh</VALUE></SETTING>
        <SETTING><NAME>Compiler</NAME><VALUE>Balloon Help</VALUE></SETTING>
        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>Launchable</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
    </SETTING>
    <SETTING>
        <SETTING><NAME>FileType</NAME><VALUE>TEXT</VALUE></SETTING>
        <SETTING><NAME>FileExtension</NAME><VALUE>.c</VALUE></SETTING>
        <SETTING><NAME>Compiler</NAME><VALUE>MW C/C++ 68K</VALUE></SETTING>
        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>Launchable</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
    </SETTING>
    <SETTING>
        <SETTING><NAME>FileType</NAME><VALUE>TEXT</VALUE></SETTING>
        <SETTING><NAME>FileExtension</NAME><VALUE>.c++</VALUE></SETTING>
        <SETTING><NAME>Compiler</NAME><VALUE>MW C/C++ 68K</VALUE></SETTING>
        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>Launchable</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
    </SETTING>
    <SETTING>
        <SETTING><NAME>FileType</NAME><VALUE>TEXT</VALUE></SETTING>
        <SETTING><NAME>FileExtension</NAME><VALUE>.cc</VALUE></SETTING>
        <SETTING><NAME>Compiler</NAME><VALUE>MW C/C++ 68K</VALUE></SETTING>
```

```
        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>Launchable</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
    </SETTING>
    <SETTING>
        <SETTING><NAME>FileType</NAME><VALUE>TEXT</VALUE></SETTING>
        <SETTING><NAME>FileExtension</NAME><VALUE>.cp</VALUE></SETTING>
        <SETTING><NAME>Compiler</NAME><VALUE>MW C/C++ 68K</VALUE></SETTING>
        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>Launchable</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
    </SETTING>
    <SETTING>
        <SETTING><NAME>FileType</NAME><VALUE>TEXT</VALUE></SETTING>
        <SETTING><NAME>FileExtension</NAME><VALUE>.cpp</VALUE></SETTING>
        <SETTING><NAME>Compiler</NAME><VALUE>MW C/C++ 68K</VALUE></SETTING>
        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>Launchable</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
    </SETTING>
    <SETTING>
        <SETTING><NAME>FileType</NAME><VALUE>TEXT</VALUE></SETTING>
        <SETTING><NAME>FileExtension</NAME><VALUE>.exp</VALUE></SETTING>
        <SETTING><NAME>Compiler</NAME><VALUE></VALUE></SETTING>
        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>Launchable</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
    </SETTING>
    <SETTING>
        <SETTING><NAME>FileType</NAME><VALUE>TEXT</VALUE></SETTING>
        <SETTING><NAME>FileExtension</NAME><VALUE>.h</VALUE></SETTING>
        <SETTING><NAME>Compiler</NAME><VALUE>MW C/C++ 68K</VALUE></SETTING>
        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>Launchable</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>IgnoredByMake</NAME><VALUE>true</VALUE></SETTING>
    </SETTING>
    <SETTING>
        <SETTING><NAME>FileType</NAME><VALUE>TEXT</VALUE></SETTING>
        <SETTING><NAME>FileExtension</NAME><VALUE>.pch</VALUE></SETTING>
        <SETTING><NAME>Compiler</NAME><VALUE>MW C/C++ 68K</VALUE></SETTING>
        <SETTING><NAME>Precompile</NAME><VALUE>true</VALUE></SETTING>
        <SETTING><NAME>Launchable</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
    </SETTING>
    <SETTING>
        <SETTING><NAME>FileType</NAME><VALUE>TEXT</VALUE></SETTING>
        <SETTING><NAME>FileExtension</NAME><VALUE>.pch++</VALUE></SETTING>
        <SETTING><NAME>Compiler</NAME><VALUE>MW C/C++ 68K</VALUE></SETTING>
        <SETTING><NAME>Precompile</NAME><VALUE>true</VALUE></SETTING>
        <SETTING><NAME>Launchable</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
    </SETTING>
    <SETTING>
        <SETTING><NAME>FileType</NAME><VALUE>TEXT</VALUE></SETTING>
        <SETTING><NAME>FileExtension</NAME><VALUE>.r</VALUE></SETTING>
        <SETTING><NAME>Compiler</NAME><VALUE>Rez</VALUE></SETTING>
        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>Launchable</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
    </SETTING>
    <SETTING>
        <SETTING><NAME>FileType</NAME><VALUE>TEXT</VALUE></SETTING>
        <SETTING><NAME>FileExtension</NAME><VALUE>.seg</VALUE></SETTING>
        <SETTING><NAME>Compiler</NAME><VALUE></VALUE></SETTING>
        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>Launchable</NAME><VALUE>false</VALUE></SETTING>
        <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
```

```
                        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
                    </SETTING>
                    <SETTING>
                        <SETTING><NAME>FileType</NAME><VALUE>docu</VALUE></SETTING>
                        <SETTING><NAME>FileExtension</NAME><VALUE></VALUE></SETTING>
                        <SETTING><NAME>Compiler</NAME><VALUE></VALUE></SETTING>
                        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
                        <SETTING><NAME>Launchable</NAME><VALUE>true</VALUE></SETTING>
                        <SETTING><NAME>ResourceFile</NAME><VALUE>true</VALUE></SETTING>
                        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
                    </SETTING>
                    <SETTING>
                        <SETTING><NAME>FileType</NAME><VALUE>rsrc</VALUE></SETTING>
                        <SETTING><NAME>FileExtension</NAME><VALUE></VALUE></SETTING>
                        <SETTING><NAME>Compiler</NAME><VALUE></VALUE></SETTING>
                        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
                        <SETTING><NAME>Launchable</NAME><VALUE>true</VALUE></SETTING>
                        <SETTING><NAME>ResourceFile</NAME><VALUE>true</VALUE></SETTING>
                        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
                    </SETTING>
                    <SETTING>
                        <SETTING><NAME>FileType</NAME><VALUE>shlb</VALUE></SETTING>
                        <SETTING><NAME>FileExtension</NAME><VALUE></VALUE></SETTING>
                        <SETTING><NAME>Compiler</NAME><VALUE>PEF Import
68K</VALUE></SETTING>
                        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
                        <SETTING><NAME>Launchable</NAME><VALUE>false</VALUE></SETTING>
                        <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
                        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
                    </SETTING>
                    <SETTING>
                        <SETTING><NAME>FileType</NAME><VALUE>stub</VALUE></SETTING>
                        <SETTING><NAME>FileExtension</NAME><VALUE></VALUE></SETTING>
                        <SETTING><NAME>Compiler</NAME><VALUE>PEF Import
68K</VALUE></SETTING>
                        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
                        <SETTING><NAME>Launchable</NAME><VALUE>false</VALUE></SETTING>
                        <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
                        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
                    </SETTING>
                    <SETTING>
                        <SETTING><NAME>FileExtension</NAME><VALUE>.doc</VALUE></SETTING>
                        <SETTING><NAME>Compiler</NAME><VALUE></VALUE></SETTING>
                        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
                        <SETTING><NAME>Launchable</NAME><VALUE>true</VALUE></SETTING>
                        <SETTING><NAME>ResourceFile</NAME><VALUE>false</VALUE></SETTING>
                        <SETTING><NAME>IgnoredByMake</NAME><VALUE>true</VALUE></SETTING>
                    </SETTING>
                    <SETTING>
                        <SETTING><NAME>FileExtension</NAME><VALUE>.rsrc</VALUE></SETTING>
                        <SETTING><NAME>Compiler</NAME><VALUE></VALUE></SETTING>
                        <SETTING><NAME>Precompile</NAME><VALUE>false</VALUE></SETTING>
                        <SETTING><NAME>Launchable</NAME><VALUE>true</VALUE></SETTING>
                        <SETTING><NAME>ResourceFile</NAME><VALUE>true</VALUE></SETTING>
                        <SETTING><NAME>IgnoredByMake</NAME><VALUE>false</VALUE></SETTING>
                    </SETTING>
                </SETTING>

                <!-- Settings for "Build Extras" panel -->
                <SETTING><NAME>CacheModDates</NAME><VALUE>true</VALUE></SETTING>
                <SETTING><NAME>ActivateBrowser</NAME><VALUE>true</VALUE></SETTING>
                <SETTING><NAME>DumpBrowserInfo</NAME><VALUE>false</VALUE></SETTING>
                <SETTING><NAME>CacheSubprojects</NAME><VALUE>true</VALUE></SETTING>
                <SETTING><NAME>UseThirdPartyDebugger</NAME><VALUE>false</VALUE></SETTING>
                <SETTING><NAME>DebuggerCommandLine</NAME><VALUE></VALUE></SETTING>
                <PANELDATA><NAME>Debugger Runtime</NAME><VALUE>
                    0200000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
```

```
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    00000000000000000000000000000000
                </VALUE></PANELDATA>

                <!-- Settings for "Debugger Target" panel -->
                <SETTING><NAME>LogSystemMessages</NAME><VALUE>true</VALUE></SETTING>
                <SETTING><NAME>AutoTargetDLLs</NAME><VALUE>false</VALUE></SETTING>
                <SETTING><NAME>StopAtWatchpoints</NAME><VALUE>true</VALUE></SETTING>
                <SETTING><NAME>PauseWhileRunning</NAME><VALUE>true</VALUE></SETTING>
                <SETTING><NAME>PauseInterval</NAME><VALUE>5</VALUE></SETTING>
                <SETTING><NAME>PauseUIFlags</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>AltExePath</NAME>
                    <SETTING><NAME>Path</NAME><VALUE></VALUE></SETTING>
                    <SETTING><NAME>PathFormat</NAME><VALUE>Generic</VALUE></SETTING>
                    <SETTING><NAME>PathRoot</NAME><VALUE>Absolute</VALUE></SETTING>
                </SETTING>

                <!-- Settings for "68K Global Optimizer" panel -->

<SETTING><NAME>GlobalOptimizer_68K_optimizationlevel</NAME><VALUE>Level0</VALUE></SETTING>

<SETTING><NAME>GlobalOptimizer_68K_optfor</NAME><VALUE>Speed</VALUE></SETTING>

                <!-- Settings for "68K CodeGen" panel -->
                <SETTING><NAME>MWCodeGen_68K_codesize</NAME><VALUE>Small</VALUE></SETTING>

<SETTING><NAME>MWCodeGen_68K_structalignment</NAME><VALUE>MC68K</VALUE></SETTING>
                <SETTING><NAME>MWCodeGen_68K_fp_mode</NAME><VALUE>Library</VALUE></SETTING>
                <SETTING><NAME>MWCodeGen_68K_code68020</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWCodeGen_68K_profiler</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWCodeGen_68K_mpwc</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWCodeGen_68K_fourbyteints</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWCodeGen_68K_IEEEdoubles</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWCodeGen_68K_fardata</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWCodeGen_68K_farvtables</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWCodeGen_68K_farstrings</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWCodeGen_68K_pcrelstrings</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWCodeGen_68K_macsbug</NAME><VALUE>New</VALUE></SETTING>
                <SETTING><NAME>MWCodeGen_68K_a6frames</NAME><VALUE>1</VALUE></SETTING>

                <!-- Settings for "CFM68K" panel -->
                <SETTING><NAME>MWCFM68K_exports</NAME><VALUE>None</VALUE></SETTING>
                <SETTING><NAME>MWCFM68K_olddefversion</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWCFM68K_oldimpversion</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWCFM68K_currentversion</NAME><VALUE>0</VALUE></SETTING>
```

```
                <SETTING><NAME>MWCFM68K_farthreshold</NAME><VALUE>256</VALUE></SETTING>
                <SETTING><NAME>PCFM68K_sharedata</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWCFM68K_fragmentname</NAME><VALUE></VALUE></SETTING>
                <SETTING><NAME>MWCFM68K_initname</NAME><VALUE></VALUE></SETTING>
                <SETTING><NAME>MWCFM68K_mainname</NAME><VALUE>__start</VALUE></SETTING>
                <SETTING><NAME>MWCFM68K_termname</NAME><VALUE></VALUE></SETTING>
                <SETTING><NAME>MWCFM68K_libfolder</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWCFM68K_alignment</NAME><VALUE>Align_2</VALUE></SETTING>

                <!-- Settings for "68K Disassembler" panel -->
                <SETTING><NAME>MWDisassembler_68K_showcode</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWDisassembler_68K_mix</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWDisassembler_68K_nohex</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWDisassembler_68K_showdata</NAME><VALUE>1</VALUE></SETTING>

<SETTING><NAME>MWDisassembler_68K_showexceptions</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWDisassembler_68K_showsym</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWDisassembler_68K_shownames</NAME><VALUE>1</VALUE></SETTING>

                <!-- Settings for "C/C++ Compiler" panel -->
                <SETTING><NAME>MWFrontEnd_C_cplusplus</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_checkprotos</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_arm</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_trigraphs</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_onlystdkeywords</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_enumsalwaysint</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_mpwpointerstyle</NAME><VALUE>0</VALUE></SETTING>

<SETTING><NAME>MWFrontEnd_C_prefixname</NAME><VALUE>WMLBrowser.h++.mch</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_ansistrict</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_mpwcnewline</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_wchar_type</NAME><VALUE>1</VALUE></SETTING>

<SETTING><NAME>MWFrontEnd_C_enableexceptions</NAME><VALUE>1</VALUE></SETTING>

<SETTING><NAME>MWFrontEnd_C_dontreusestrings</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_poolstrings</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_dontinline</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_useRTTI</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_multibyteaware</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_unsignedchars</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_autoinline</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_booltruefalse</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_direct_to_som</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_som_env_check</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_alwaysinline</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_inlinelevel</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_ecplusplus</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_objective_c</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWFrontEnd_C_defer_codegen</NAME><VALUE>0</VALUE></SETTING>

                <!-- Settings for "68K Linker" panel -->
                <SETTING><NAME>MWLinker_68K_linksym</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWLinker_68K_symfullpath</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWLinker_68K_linksingle</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWLinker_68K_fastlink</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWLinker_68K_generateMap</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWLinker_68K_nolinkwarnings</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWLinker_68K_glueintosegone</NAME><VALUE>1</VALUE></SETTING>

<SETTING><NAME>MWLinker_68K_dontdeadstripinitcode</NAME><VALUE>0</VALUE></SETTING>
                <PANELDATA><NAME>PalmRez Panel</NAME><VALUE>
                    040001000A426C617A65722E746D7070746D7000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
```

```
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    00000000A426C617A65722E70726363707263000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000006426C617A6572000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    000000006170706C626C6B31010000000000000000000300010000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                    0000000000000000000000000000000000000000000000000000000000000000
                </VALUE></PANELDATA>

                <!-- Settings for "68K Project" panel -->
                <SETTING><NAME>MWProject_68K_type</NAME><VALUE>PilotApp</VALUE></SETTING>

<SETTING><NAME>MWProject_68K_outfile</NAME><VALUE>Blazer.tmp</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_symfilename</NAME><VALUE></VALUE></SETTING>

<SETTING><NAME>MWProject_68K_filecreator</NAME><VALUE>1145394002</VALUE></SETTING>

<SETTING><NAME>MWProject_68K_filetype</NAME><VALUE>1668445042</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_size</NAME><VALUE>384</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_flags</NAME><VALUE>22656</VALUE></SETTING>

<SETTING><NAME>MWProject_68K_rsrcheader</NAME><VALUE>Custom</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_rsrcname</NAME><VALUE></VALUE></SETTING>

<SETTING><NAME>MWProject_68K_rsrctype</NAME><VALUE>1061109567</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_rsrcid</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_rsrcmulti</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_rsrcstore</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_rsrcmerge</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_rsrcflags</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_a4</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_minsize</NAME><VALUE>384</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_rsrcsegtype</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_cfm68kcodegen</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_stacksize</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_thedebugger</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_rsrc_custom</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_is_rseg_app</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWProject_68K_is_pilot_lib</NAME><VALUE>0</VALUE></SETTING>

<SETTING><NAME>MWProject_68K_pilot_main_entry</NAME><VALUE></VALUE></SETTING>

                <!-- Settings for "Rez Compiler" panel -->
                <SETTING><NAME>MWRez_Language_maxwidth</NAME><VALUE>80</VALUE></SETTING>
```

```
                <SETTING><NAME>MWRez_Language_script</NAME><VALUE>Roman</VALUE></SETTING>
<SETTING><NAME>MWRez_Language_alignment</NAME><VALUE>Align1</VALUE></SETTING>

<SETTING><NAME>MWRez_Language_filtermode</NAME><VALUE>FilterSkip</VALUE></SETTING>

<SETTING><NAME>MWRez_Language_suppresswarnings</NAME><VALUE>0</VALUE></SETTING>

<SETTING><NAME>MWRez_Language_escapecontrolchars</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWRez_Language_prefixname</NAME><VALUE></VALUE></SETTING>
                <SETTING><NAME>MWRez_Language_filteredtypes</NAME><VALUE>'CODE' 'DATA'
'PICT'</VALUE></SETTING>

                <!-- Settings for "C/C++ Warnings" panel -->
                <SETTING><NAME>MWWarning_C_warn_illpragma</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWWarning_C_warn_emptydecl</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWWarning_C_warn_possunwant</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWWarning_C_warn_unusedvar</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWWarning_C_warn_unusedarg</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWWarning_C_warn_extracomma</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWWarning_C_pedantic</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWWarning_C_warningerrors</NAME><VALUE>0</VALUE></SETTING>
                <SETTING><NAME>MWWarning_C_warn_hidevirtual</NAME><VALUE>1</VALUE></SETTING>

<SETTING><NAME>MWWarning_C_warn_implicitconv</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWWarning_C_warn_notinlined</NAME><VALUE>1</VALUE></SETTING>
                <SETTING><NAME>MWWarning_C_warn_structclass</NAME><VALUE>1</VALUE></SETTING>
            </SETTINGLIST>
            <FILELIST>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLApplication.cpp</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                    <FILEKIND>Text</FILEKIND>
                    <FILEFLAGS>Debug</FILEFLAGS>
                </FILE>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLPrefs.cpp</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                    <FILEKIND>Text</FILEKIND>
                    <FILEFLAGS>Debug</FILEFLAGS>
                </FILE>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>Main.cpp</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                    <FILEKIND>Text</FILEKIND>
                    <FILEFLAGS>Debug</FILEFLAGS>
                </FILE>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLApplication.h</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                    <FILEKIND>Text</FILEKIND>
                    <FILEFLAGS></FILEFLAGS>
                </FILE>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLPrefs.h</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                    <FILEKIND>Text</FILEKIND>
                    <FILEFLAGS></FILEFLAGS>
                </FILE>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>PrecompiledHeaders.pch++</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                    <FILEKIND>Text</FILEKIND>
                    <FILEFLAGS>Debug</FILEFLAGS>
                </FILE>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BrowserApp.cpp</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
```

```
                    <FILEKIND>Text</FILEKIND>
                    <FILEFLAGS>Debug</FILEFLAGS>
                </FILE>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BrowserApp.h</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                    <FILEKIND>Text</FILEKIND>
                    <FILEFLAGS></FILEFLAGS>
                </FILE>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLVector.h</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                    <FILEKIND>Text</FILEKIND>
                    <FILEFLAGS></FILEFLAGS>
                </FILE>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLIterator.h</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                    <FILEKIND>Text</FILEKIND>
                    <FILEFLAGS></FILEFLAGS>
                </FILE>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLForm.h</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                    <FILEKIND>Text</FILEKIND>
                    <FILEFLAGS></FILEFLAGS>
                </FILE>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLForm.cpp</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                    <FILEKIND>Text</FILEKIND>
                    <FILEFLAGS>Debug</FILEFLAGS>
                </FILE>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLEventHandler.h</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                    <FILEKIND>Text</FILEKIND>
                    <FILEFLAGS></FILEFLAGS>
                </FILE>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLView.cpp</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                    <FILEKIND>Text</FILEKIND>
                    <FILEFLAGS>Debug</FILEFLAGS>
                </FILE>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLView.h</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                    <FILEKIND>Text</FILEKIND>
                    <FILEFLAGS></FILEFLAGS>
                </FILE>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLGlyph.cpp</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                    <FILEKIND>Text</FILEKIND>
                    <FILEFLAGS>Debug</FILEFLAGS>
                </FILE>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLGlyph.h</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                    <FILEKIND>Text</FILEKIND>
                    <FILEFLAGS></FILEFLAGS>
                </FILE>
                <FILE>
                    <PATHTYPE>Name</PATHTYPE>
```

```
        <PATH>BLStack.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLView.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLView.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLTypes.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLURLHandler.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLForm.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLForm.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLSession.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLSession.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>MSL Runtime Palm OS (2i).Lib</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Library</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLUtils.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
```

```
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLUtils.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLBookmarkDB.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLBookmark.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLBookmarkDB.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLBookmark.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLMemoryManager.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLMemoryManager.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BrowserRsc1.rsrc</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Resource</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLVectorHeader.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLTable.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLTable.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
```

```
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLActions.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLActions.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLPagesDB.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLPagesDB.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>HTTPRequest.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>HTTPRequest.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>NetSocket.c</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLNetworking.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLNetworking.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>XMLParser.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>WBXMLConstants.h</PATH>
```

```
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>WBXMLParser.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>WBXMLParser.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLCacheDB.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLCacheDB.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLDatabase.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLDatabase.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>WMLState.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>WMLState.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS>Debug</FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BrowserRsc1_res.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLInput.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
        <FILEKIND>Text</FILEKIND>
        <FILEFLAGS></FILEFLAGS>
    </FILE>
    <FILE>
```

```
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLWMLInput.cpp</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
            <FILEKIND>Text</FILEKIND>
            <FILEFLAGS>Debug</FILEFLAGS>
        </FILE>
        <FILE>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>WMLVariables.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
            <FILEKIND>Text</FILEKIND>
            <FILEFLAGS></FILEFLAGS>
        </FILE>
        <FILE>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>WMLVariables.cpp</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
            <FILEKIND>Text</FILEKIND>
            <FILEFLAGS>Debug</FILEFLAGS>
        </FILE>
    </FILELIST>
    <SEGMENTLIST>
        <SEGMENT>
            <NAME>Main Segment</NAME>
            <ATTRIBUTES>Protected, Purgeable</ATTRIBUTES>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>PrecompiledHeaders.pch++</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLWMLSession.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BrowserRsc1.rsrc</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>NetSocket.c</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>Main.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BrowserApp.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BrowserApp.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLWMLView.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLWMLView.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLTypes.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
```

```
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>HTTPRequest.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>HTTPRequest.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLNetworking.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLNetworking.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>MSL Runtime Palm OS (2i).Lib</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>WBXMLConstants.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLCacheDB.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLDatabase.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLDatabase.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>WMLState.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>WMLState.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BrowserRsc1_res.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLWMLInput.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLWMLInput.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>WMLVariables.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
```

```
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>WMLVariables.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
        </SEGMENT>
        <SEGMENT>
            <NAME>BL1</NAME>
            <ATTRIBUTES>Protected, Purgeable</ATTRIBUTES>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLMemoryManager.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLWMLTable.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLWMLTable.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLVector.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLPrefs.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>XMLParser.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLCacheDB.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLApplication.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLPrefs.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLApplication.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLIterator.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLForm.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLForm.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
```

```
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLEventHandler.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLGlyph.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLGlyph.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLStack.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLView.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLView.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
        </SEGMENT>
        <SEGMENT>
            <NAME>BL2</NAME>
            <ATTRIBUTES>Protected, Purgeable</ATTRIBUTES>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>WBXMLParser.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>WBXMLParser.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLURLHandler.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLWMLForm.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLWMLForm.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLWMLSession.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLUtils.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLUtils.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <PATHTYPE>Name</PATHTYPE>
```

```
                    <PATH>BLWMLActions.h</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                </FILEREF>
                <FILEREF>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLWMLActions.cpp</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                </FILEREF>
                <FILEREF>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLBookmarkDB.h</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                </FILEREF>
                <FILEREF>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLBookmark.h</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                </FILEREF>
                <FILEREF>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLBookmarkDB.cpp</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                </FILEREF>
                <FILEREF>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLBookmark.cpp</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                </FILEREF>
                <FILEREF>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLMemoryManager.h</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                </FILEREF>
                <FILEREF>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLVectorHeader.h</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                </FILEREF>
                <FILEREF>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLPagesDB.h</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                </FILEREF>
                <FILEREF>
                    <PATHTYPE>Name</PATHTYPE>
                    <PATH>BLPagesDB.cpp</PATH>
                    <PATHFORMAT>Windows</PATHFORMAT>
                </FILEREF>
            </SEGMENT>
        </SEGMENTLIST>
    </TARGET>
</TARGETLIST>

<TARGETORDER>
    <ORDEREDTARGET><NAME>Blazer</NAME></ORDEREDTARGET>
</TARGETORDER>

<GROUPLIST>
    <GROUP><NAME>AppSource</NAME>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BrowserApp.cpp</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BrowserApp.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BrowserRsc1.rsrc</PATH>
```

```
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BrowserRsc1_res.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>Main.cpp</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>PrecompiledHeaders.pch++</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
    </GROUP>
    <GROUP><NAME>BL Source</NAME>
        <GROUP><NAME>Palm</NAME>
            <FILEREF>
                <TARGETNAME>Blazer</TARGETNAME>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLApplication.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <TARGETNAME>Blazer</TARGETNAME>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLApplication.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <TARGETNAME>Blazer</TARGETNAME>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLCacheDB.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <TARGETNAME>Blazer</TARGETNAME>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLCacheDB.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <TARGETNAME>Blazer</TARGETNAME>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLDatabase.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <TARGETNAME>Blazer</TARGETNAME>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLDatabase.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <TARGETNAME>Blazer</TARGETNAME>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLEventHandler.h</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <TARGETNAME>Blazer</TARGETNAME>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLForm.cpp</PATH>
                <PATHFORMAT>Windows</PATHFORMAT>
            </FILEREF>
            <FILEREF>
                <TARGETNAME>Blazer</TARGETNAME>
                <PATHTYPE>Name</PATHTYPE>
                <PATH>BLForm.h</PATH>
```

```
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLNetworking.cpp</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLNetworking.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLPagesDB.cpp</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLPagesDB.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLPrefs.cpp</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLPrefs.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLURLHandler.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLView.cpp</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLView.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>HTTPRequest.cpp</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>HTTPRequest.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
    </GROUP>
    <GROUP><NAME>Utility</NAME>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLIterator.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
```

```
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLMemoryManager.cpp</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLMemoryManager.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLStack.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLTypes.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLUtils.cpp</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLUtils.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLVector.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLVectorHeader.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
    </GROUP>
    <GROUP><NAME>WML</NAME>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLGlyph.cpp</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLGlyph.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLWMLActions.cpp</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>BLWMLActions.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
```

```
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLForm.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLForm.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLInput.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLInput.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLSession.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLSession.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLTable.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLTable.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLView.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLWMLView.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>WBXMLConstants.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>WBXMLParser.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
```

```
            <PATH>WBXMLParser.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>WMLState.cpp</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>WMLState.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>XMLParser.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>WMLVariables.h</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
        <FILEREF>
            <TARGETNAME>Blazer</TARGETNAME>
            <PATHTYPE>Name</PATHTYPE>
            <PATH>WMLVariables.cpp</PATH>
            <PATHFORMAT>Windows</PATHFORMAT>
        </FILEREF>
    </GROUP>
</GROUP>
<GROUP><NAME>Bookmarks</NAME>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLBookmark.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLBookmark.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLBookmarkDB.cpp</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>BLBookmarkDB.h</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
</GROUP>
<GROUP><NAME>PalmOS</NAME>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>MSL Runtime Palm OS (2i).Lib</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
    <FILEREF>
        <TARGETNAME>Blazer</TARGETNAME>
        <PATHTYPE>Name</PATHTYPE>
        <PATH>NetSocket.c</PATH>
        <PATHFORMAT>Windows</PATHFORMAT>
    </FILEREF>
</GROUP>
```

```
    </GROUPLIST>

</PROJECT>
// WMLState.cpp

#include "BLWMLActions.h"

LineMetrics::LineMetrics()
{
    MemSet(this, sizeof(*this), 0);
}


TextState::TextState()
{
    MemSet(this, sizeof(*this), 0);

    bits.wordWrap = true;
}


void
TextState::enable()
{
    WinSetUnderlineMode(underline);

    if(bits.big && bits.strong)
        FntSetFont(largeBoldFont);
    else if(bits.big)
        FntSetFont(largeFont);
    else if(bits.strong)
        FntSetFont(boldFont);
    else
        FntSetFont(stdFont);
}


void
TextState::enable(const TextState &/*previous*/)
{
    // !!! future optimization: only turn on distinct states

    enable();
}


BLHistoryItem::BLHistoryItem(CharPtr url, CharPtr cardID)
{
    mURL = url;
    mCardID = cardID;
}


BLHistoryItem::~BLHistoryItem()
{
    delete[] mURL;
    delete[] mCardID;
}
// WMLState.h

#pragma once

#include "BLTypes.h"

class WMLAction;

class LineMetrics
{
    public:

        LineMetrics();

        Point getExtent() { return Point(width, height());  }

        int height() { return baselineOffset + overhang; }
```

```
        int width;
        int baselineOffset;
        int overhang;
        int leadingSpace;
};


class TextState
{
    public:

                TextState();

        static  TextState getBasicState() { TextState state; return state; }
        static  void enableBasicState() { TextState state; state.enable(); }

                void enable();
                void enable(const TextState &previous);

                void setWordWrap(bool isOn)
                    { if(bits.wordWrap && !isOn) bits.wordWrap = false; }

        UnderlineModeType underline;

        struct
        {
            bool wordWrap : 1;
            bool italic : 1;
            bool strong : 1;
            bool emphasis : 1;
            bool big : 1;
            bool small : 1;
            bool preformatted : 1;
        } bits;

        WMLAction * action;
};


class BLHistoryItem
{
    public:

                            BLHistoryItem(CharPtr url, CharPtr cardID);
                            ~BLHistoryItem();
                    CharPtr getURL() { return mURL; }
                    CharPtr getCardID() { return mCardID; }
    protected:

        CharPtr mURL;
        CharPtr mCardID;
};


enum NavigationAction { kNone = 0, kGoTo, kGoBack, kGoForward };

//  WMLVariables.cpp

#include "WMLVariables.h"
#include "BLUtils.h"

const int kInitNumBuckets = 17;
const int kNameBufLen = 256;

WMLVariables::WMLVariables()
{
    mNumBuckets = kInitNumBuckets;
    mBuckets = new VarEntry*[mNumBuckets];

    for(int i=0; i<mNumBuckets; i++)
    {
        mBuckets[i] = NULL;
    }
}
```

```
WMLVariables::~WMLVariables()
{
    delete [] mBuckets;
}


VarEntry *
WMLVariables::findEntry(CharPtr key)
{
    VarEntry * entry = mBuckets[hashFunction(key)];

    while(entry != NULL)
    {
        if(StrCompare(key, entry->name) == 0)
            return entry;

        entry = entry->next;
    }

    return NULL;
}


CharPtr
WMLVariables::lookup(CharPtr key)
{
    if(key == NULL)
        return NULL;

    VarEntry * entry = findEntry(key);

    if(entry)
        return entry->value;
    else
        return NULL;
}


void
WMLVariables::add(CharPtr key, CharPtr value)
{
    if((key == NULL) || (value == NULL))
        return;

    VarEntry * entry = findEntry(key);

    if(entry != NULL)
    {
        delete [] entry->value;

        entry->value = BLUtils::cloneString(value);
        return;
    }

    UInt bucketNum = hashFunction(key);

    entry = new VarEntry(  BLUtils::cloneString(key),
                           BLUtils::cloneString(value));

    if(entry == NULL)
        return;

    entry->next = mBuckets[bucketNum];
    mBuckets[bucketNum] = entry;
}


UInt
WMLVariables::hashFunction(CharPtr key)
{
    ULong hash;
    ULong len = StrLen(key);
    UInt i;
```

```
    for(hash=len, i=0; i<len; i++)
        hash = (hash << 4) ^ (hash >> 28) ^ key[i];

    return (UInt)(hash % (ULong)mNumBuckets);
}

enum VarState { kLooking, kDollarSign, kInOpenParen, kInVariable };

bool
WMLVariables::insertVariables( CharPtr &destination,
                               const CharPtr source,
                               int destBufferLength)
{
    UInt pos = 0;
    UInt destPos = 0;
    UInt varPos = 0;

    Char varName[kNameBufLen];

    VarState state = kLooking;

    while(source[pos])
    {
        if((destPos+1) >= destBufferLength)
            return false;

        switch(state)
        {
            case kLooking:
                if(source[pos] == '$')
                {
                    state = kDollarSign;
                    break;
                }

                destination[destPos++] = source[pos];
                break;

            case kDollarSign:
                if(source[pos] == '$')
                {
                    state = kLooking;
                    destination[destPos++] = source[pos];
                    break;
                }
                else if(source[pos] == '(')
                {
                    state = kInOpenParen;
                    varPos = 0;
                    break;
                }
                else
                {
                    state = kInVariable;
                    varPos = 0;
                    varName[varPos++] = source[pos];
                    break;
                }

            case kInOpenParen:
            case kInVariable:
                if( (kInOpenParen && (source[pos] == ')')) ||
                    (kInVariable && BLUtils::isWhitespace(source[pos])))
                {
SUB_VAR:            varName[varPos] = '\0';
                    CharPtr value = lookup(varName);

                    if(value)
                    {
                        if(!BLUtils::copyStringIfRoom(destination + destPos, value,
destBufferLength - (int)destPos))
                            return false;

                        destPos += StrLen(value);
```

```
                }
                state = kLooking;
                break;
            }
            else if(source[pos] == ':')
            {
                varName[varPos++] = '\0';
                break;
            }
            else
            {
                varName[varPos++] = source[pos];
                break;
            }
        }

        pos++;
    }

    if(state == kInVariable)
    {
        pos--;
        goto SUB_VAR;
    }

    destination[destPos] = '\0';

    return true;
}


//  WMLVariables.h

class VarEntry
{
    public:

        VarEntry(CharPtr nm, CharPtr val) { name = nm; value = val; }

        CharPtr name;
        CharPtr value;

        VarEntry * next;
};

class WMLVariables
{
    public:

        virtual             WMLVariables();
                            ~WMLVariables();

                    CharPtr lookup(CharPtr key);
                    void    add(CharPtr key, CharPtr value);

                    bool    insertVariables(CharPtr &destination, const CharPtr source, int
destBufferLength);

    protected:

                    VarEntry *  findEntry(CharPtr key);

                    UInt        hashFunction(CharPtr key);

                    int         mNumBuckets;
                    VarEntry ** mBuckets;

};// WBXMLParser.h

#pragma once

#include "BLVector.h"
```

```
#include "BLTypes.h"
#include "BLMemoryManager.h"

class WMLRoot;

class XMLParser : public DataReader
{
    public:

        virtual ULong readData(CharPtr buffer, ULong length) = 0;
                WMLRoot * getRoot() { return mRoot; }

    protected:

        WMLRoot *   mRoot;
};
```

APPENDIX D

Functional Requirements Document

handspring

BLUESKY

MOBILE APPLICATION SERVER

Functional Requirements Document

Version 0.1, 1/30/2001

Revision notes

Version	Date	Author	Comments
0.1	1/30/01	Katie	Written based on my interpretation of Ben's brain dump. Still needs attachments for ZML DTD and list of supported elements of HTML and WML

1 Overview

Handspring's BlueSky mobile application server includes two main components, an HTTP proxy server module (proxy) and a content transformation module (CTM). The proxy is a generic HTTP proxy that accepts requests for Web pages from the Blazer client and passes those requests on to remote Web servers. Once Web content is returned to the proxy from those remote Web servers, it is dynamically run through a series of transformations on the CTM, then transformed content is streamed back to the Blazer client. These two modules are further described below.

2 Purpose

The BlueSky mobile application server provides users of mobile devices with the ability to view a wide variety of Web content. Currently, the majority of Internet content is designed to be viewed on desktop computers. Most mobile devices differ dramatically from desktop computers with regard to screen size, processor power, and color capabilities. The BlueSky server optimizes Web content to improve the wireless Web experience for users of mobile devices. First, the proxy server acts as a connected agent on behalf of mobile users, storing important personal and account information and managing much of the "heavy lifting" that would slow down Web access in the absence of the proxy. To augment the value of the proxy, the CTM optimizes pages designed for desktop use to viewing on a smaller screen device.

3 Content Transformation Module (CTM)

The purpose of the CTM is to optimize Web content for viewing on a small screen device. The CTM adapts content to the screen size and display capabilities of the device. Currently, this adaptation is geared toward screens that measure 160x160 pixels and to devices that run on the Palm operating system *[is there anything specific to Palm OS in the CTM?]*

The CTM actually consists of a series of discrete transformations that convert Web documents and images to formats that are understandable to a Palm OS device running the Blazer browser. Those transformations include transcoding HTML, HDML, WML and cHTML documents to "ZML" and adapting images to meet the device capabilities. The following is a description of those processes.

3.1 Transcoding: HTML, HDML, WML, & cHTML to "ZML"

The CTM transcodes documents from several markup languages to "ZML," a language unique to Blazer that is a superset of WML.

3.1.1 "ZML"

Blazer natively displays documents marked up in "ZML," a language unique to Blazer that is a superset of WML. ZML supports all elements in the WML 1.1 specification, including Phone.com (now OpenWave) language extensions. In addition, ZML also supports additional extensions that optimize support for HTML pages. Following is a list of the extensions supported by ZML [*Need to fill in list*]:

	Elements	Attributes	Description
phone.com	<link>		
phone.com	<spawn>		
phone.com	<exit>		
phone.com	<catch>		
phone.com	<throw>		
	<hr>		inserts a horizontal line
	<base>		

	<form>		

3.1.2 HTML or cHTML to ZML

The majority of pages accessed by most Blazer users are HTML pages. HTML pages go through a series of steps as they are transcoded to ZML pages. These steps are outlined below:

3.1.2.1 Step One: Convert HTML to valid, well-formed XML document

The first step in the transcoding of HTML to ZML is to convert the HTML into a valid, well-formed XML document. To do this, the CTM uses a generic algorithm to "normalize" the markup language to ensure that the HTML document conforms to the HTML Document Type Description (DTD). During this process, the CTM "fixes" HTML that does not conform to the DTD. Well-formed XML documents must include the following (from URL: http://www.ucc.ie/xml/):

- All tags must be balanced: that is, all elements which may contain character data must have both start- and end-tags present (omission is not allowed except for empty elements, see below);
- All attribute values must be in quotes (the single-quote character [the apostrophe] may be used if the value contains a double-quote character, and vice versa): if you need both, use ' or " (do *not* under any circumstances use the typographic (curly) 'inverted commas' for quoting attribute values);
- Any EMPTY element tags (e.g. those with no end-tag like HTML's <IMG>, <HR>, and <BR> and others) must either end with '/>' or you have to make them appear non-EMPTY by adding a real end-tag; Example: <BR> would become either <BR/> or
</BR>.
- There must not be any isolated markup-start characters (< or &) in your text data (ie they must be given as < and &), and the sequence]]> must be given as]]> unless you really are using it as the end of a CDATA marked section;
- Elements must nest inside each other properly (no overlapping markup, same rule as for all SGML, including HTML);
- Well-formed documents with no DTD may use attributes on any element, but the attributes are assumed to be all of type CDATA. You cannot use ID/IDREF attributes in DTDless documents.

In addition to using the generic algorithm to normalize the document, the CTM applies additional rules to manage special cases. These additional rules are outlined below [*need details on additional rules*]:

3.1.2.2 Step Two: Strip out unsupported content

Once the HTML has been converted to a valid, well-formed XML document, the CTM strips out content that cannot be supported by the Blazer browser. Supported content includes a subset of the HTML 3.2 DTD and the WML 1.1 DTD including the Phone.com/OpenWave extensions (see attached). Examples of elements that are not supported include: scripts (JavaScript, VBscript), Java applets, plug-ins (e.g. Flash, Shockwave, RealAudio) [*I'm sure there are more here...*]

The list of elements and attributes that are supported is subject to change regularly.

3.1.2.3 Step Three: Reformat content for layout on screen

The CTM applies a number of rules to the content to optimize for viewing on a small-screen device. For example, the CTM strips out extra white space by removing extra line break tags (<BR>), changing line breaks to paragraph tags, stripping out empty paragraph tags, stripping out line break tags at the beginning or end of table cells, etc. In addition, the CTM unrolls large page-level tables and displays elements from within the table stacked (?) on a page. The CTM preserves certain nested tables that fit within the device screen constraints. [*Not including further details about this...trade secret :)*]

3.1.2.4 Step Four: Convert to ZML

To convert the valid, well-formed XML document to ZML, the CTM changes HTML tags to their equivalent ZML tags (WML + phone.com language extensions + additional extensions). For example, the header tags (<H1, H2, etc.) are not supported in ZML. In this case, the CTM changes the header tags to equivalent WML tags that display text big and bold (`<h1>text</h1>` to `<big><b>text</b></big>`).

3.1.2.5 Step Five: Convert ZML to ZML-C

The ZML created by the CTM is then converted to binary (tokenized) ZML-C according to the specifications for WBXML before it is sent to the device. This compact binary representation of ZML reduces the transmission size of the document with no loss of functionality or semantic information.

3.1.2.6 Special treatment of sites identified as optimized for handheld devices

Web pages that include meta tags designating them as optimized for handheld devices are treated differently. These pages are typically marked up in HTML and are geared toward users of Palm and PocketPC devices. They include the following tags in their headers: `<meta name="HandheldFriendly" content="true">` or `<meta name=PalmComputingPlatform content=true>`.

When parsing (?) handheld-friendly sites, the CTM preserves all tables unaltered (i.e. does not unroll tables). It also converts certain types of URLs (found in Palm PQAs) to URLs that point to appropriate files on the content Web server. Lastly, the CTM converts certain elements used in PQA pages (DeviceID and %zipcode) to WML-style variables.

3.1.3 HDML & WML to ZML

The CTM also converts HDML (pre-cursor to WML; still widely used for site compatibility with all phone.com UP browsers) to WML and WML to ZML. There are very few changes that happen during this conversion as ZML is essentially WML with certain extensions. [*What's involved in converting HDML to WML?*]

3.2 Images

In a parallel process, the CTM converts images into a format that is supported by the device. This process is currently geared toward Palm OS device screens and capabilities (e.g., screens with 160x160 pixels with 7 pixel scrollbar, particular image bit depths).

3.2.1 Scaling image height and width

Currently, the CTM reduces the size of any image that exceeds 153 pixels in height or width. The image is scaled proportionally until the longer of the two dimensions is exactly 153 pixels. We anticipate that future versions of the CTM will apply additional intelligence to image scaling. For example, many Web sites place several images flush next to one another horizontally on the screen to represent a single image (e.g. a navigation bar). The CTM should recognize these images as linked and scale them all by the same factor so that they maintain their position on the screen.

3.2.2 Reducing image bit depth; convert to Palm bitmap

The CTM also converts the image to the bit depth that is supported by the device and specified by the user preference. This information is communicated to the CTM when the browser makes its request. Images are also converted from several formats (GIF, JPG, WBMP, PNG, BMP) to Palm bitmaps.

4 Proxy module

The BlueSky proxy module is a generic HTTP proxy. It includes a few features that enhance the base functionality of an HTTP proxy, including establishing and verifying user account information, intercepting and storing cookies, handling server redirects, and enabling 128bit RSA security to secure remote Web sites. There is some possibility that we may opt to use a commercially available proxy for much of the base functionality and add support for user accounts, cookies, server redirects, and security to that product.

4.1 User accounts

The proxy requires a username and password to authenticate client devices. Users establish this username and password through an account setup on the Bluelark (later, Handspring) Web site. The username must be unique (in the future it will be email address) and the password must be an alphanumeric string greater than five characters. The username and password information is stored in an Oracle database and links the user to their stored cookies (see below). [*Anything else?*]

4.2 Cookies

The proxy module intercepts cookies that are sent from the remote Web server and stores them in an Oracle database. Typically, these cookies reside in a text file on the client device. There are several reasons that the proxy intercepts cookies. First, storing cookies on the server preserves valuable storage memory on the device. Second, if a user is forced to do a hard reset of their device, or if they use Blazer from another device or upgrade to a new device, this information continues to be available to them. Third, storing cookies on the proxy provides for faster access to sites that require cookies. The server is able to attach individual user cookies to requests that need them. [*What other reasons are there?*]

4.3 Server redirects

The proxy module also handles server redirects for the browser to improve the speed of access to the desired Web page. Rather than send data to the browser and require the browser to re-request the page, the server handles this without notifying the browser. The proxy has a limit on the total number of sequential redirects of xx.

4.4 Security

The proxy provides HTTPS support for secure connections, offering 128 bit elliptical curve cryptography (ECC) between the client and the proxy server and RSA encryption between the proxy and the target Web site. The encryption is maintained through the data carrier network. Data is unencrypted on the proxy and reencrypted before it is sent to the client device. Security is maintained through physical and electronic means (firewall, fortress???)

APPENDIX E

ADAPTING TO NETWORK AND CLIENT VARIATIONS USING INFRASTRUCTURAL PROXIES: LESSONS AND PERSPECTIVES

ADAPTING TO NETWORK AND CLIENT VARIATION USING INFRASTRUCTURAL PROXIES: LESSONS AND PERSPECTIVES

Adapting to Network and Client Variation Using Infrastructural Proxies: Lessons and Perspectives

Armando Fox   Steven D. Gribble   Yatin Chawathe
Eric A. Brewer
{fox,gribble,yatin,brewer}@cs.berkeley.edu

Today's Internet clients vary widely with respect to both hardware and software properties: screen size, color depth, effective bandwidth, processing power, and the ability to handle different data formats. The order-of-magnitude span of this variation is too large to hide at the network level, making application-level techniques necessary. We show that on-the-fly adaptation by transformational proxies is a widely applicable, cost-effective, and flexible technique for addressing all these types of variation. To support this claim, we describe our experience with datatype-specific distillation (lossy compression) in a variety of applications. We also argue that placing adaptation machinery in the network infrastructure, rather than inserting it into end servers, enables incremental deployment and amortization of operating costs. To this end, we describe a programming model for large-scale interactive Internet services and a scalable cluster-based framework that has been in production use at UC Berkeley since April 1997. We present a detailed examination of TranSend, a scalable transformational Web proxy deployed on our cluster framework, and give descriptions of several handheld-device applications that demonstrate the wide applicability of the proxy-adaptation philosophy.

1 Infrastructural On-the-Fly Adaptation Services

1.1 Heterogeneity: Thin Clients and Slow Networks

The current Internet infrastructure includes an extensive range and number of clients and servers. Clients vary along many axes, including screen size, color depth, effective bandwidth, processing power, and ability to handle specific data encodings, e.g., GIF, PostScript, or MPEG. As shown in tables 1 and 2, each type of variation often spans orders of magnitude. High-volume devices such as smart phones [12] and smart two-way pagers will soon constitute an increasing fraction of Internet clients, making the variation even more pronounced.

These conditions make it difficult for servers to provide a level of service that is appropriate for every client. Application-level adaptation is required to provide a *meaningful* Internet experience across the range of client capabilities. Despite continuing improvements in client computing power and connectivity, we expect the high end to advance roughly in parallel with the low end, effectively maintaining a gap between the two and therefore the need for application-level adaptation.

Platform	SPEC92/ Memory	Screen Size	Bits/ pixel
High-end PC	200/64M	1280x1024	24
Midrange PC	160/32M	1024x768	16
Typ. Laptop	110/16M	800x600	8
Typical PDA	low/2M	320x200	2

Table 1: **Physical variation among clients**

Network	Bandwidth (bits/s)	Round-Trip Time
Local Ethernet	10-100 M	0.5 - 2.0 ms
ISDN	128 K	10-20 ms
Wireline Modem	14.4 - 56 K	350 ms
Cellular/CDPD	9.6 - 19.2 K	0.1 - 0.5 s

Table 2: **Typical Network Variation**

1.2 Approach: Infrastructural Proxy Services

We argue for a *proxy-based approach* to adaptation, in which proxy agents placed between clients and servers perform aggressive computation and storage on behalf of clients. The proxy ap-

proach stands in contrast to the *client-based approach*, which attempts to bring all clients up to a least-common-denominator level of functionality (e.g. text-only, HTML-subset compatibility for thin-client Web browsers), and the *server-based approach*, which attempts to insert adaptation machinery at each end server. We believe the proxy approach directly confers three advantages over the client and server approaches.

- **Leveraging the installed infrastructure through incremental deployment.** The enormous installed infrastructure, and its attendant base of existing content, is too valuable to waste; yet some clients cannot handle certain data types effectively. A compelling solution to the problem of client and network heterogeneity should allow interoperability with existing servers, thus enabling incremental deployment while evolving content formats and protocols are tuned and standardized for different target platforms. A proxy-based approach lends itself naturally to transparent incremental deployment, since an application-level proxy appears as a server to existing clients and as a client to existing servers.
- **Rapid prototyping during turbulent standardization cycles.** Software development on "Internet time" does not allow for long deployment cycles. Proxy-based adaptation provides a smooth path for rapid prototyping of new services, formats, and protocols, which can be deployed to servers (or clients) later if the prototypes succeed.
- **Economy of scale.** Basic queueing theory shows that a large central (virtual) server is more efficient in both cost and utilization (though less predictable in per-request performance) than a collection of smaller servers; standalone desktop systems represent the degenerate case of one "server" per user. This supports the argument for Network Computers [28] and suggests that collocating proxy services with infrastructural elements such as Internet points-of-presence (POPs) is one way to achieve effective economies of scale.

Large-scale network services remain difficult to deploy because of three fundamental challenges: scalability, availability and cost effectiveness. By scalability, we mean that when the load offered to the service increases, an incremental and linear increase in hardware can maintain the same per-user level of service. By availability, we mean that the service as a whole must be available 24 × 7, despite transient partial hardware or software failures. By cost effectiveness, we mean that the service must be economical to administer and expand, even though it potentially comprises many workstation nodes operating as a centralized cluster or "server farm". In section 3 we describe how we have addressed these challenges in our cluster-based proxy application server architecture.

1.3 Contributions and Map of Paper

In section 2 we describe our measurements and experience with *datatype-specific distillation and refinement*, a mechanism that has been central to our proxy-based approach to network and client adaptation. In section 3 we introduce a generalized "building block" programming model for designing and implementing adaptive applications, describe our implemented cluster-based application server that instantiates the model, and present detailed measurements of a particular production application: TranSend, a transformational Web proxy service. In section 4 we present case studies of other services we have built using our programming model, some of which are in daily use by thousands of users, including the Top Gun Wingman graphical Web browser for the 3Com PalmPilot handheld device. We discuss related work in section 5, and attempt to draw some lessons from our experience and guidelines for future research in section 6.

2 Adaptation via Datatype Specific Distillation

We propose three design principles that we believe are fundamental for addressing client variation most effectively.

1. **Adapt to client variation via datatype-specific lossy compression.**

   Datatype-specific lossy compression mechanisms can achieve much better compression than "generic" compressors, because they can make intelligent decisions about what information to throw away based on the semantic type of the data. For example, lossy compression of an image requires discarding color information, high-frequency components, or pixel resolution. Lossy compression of video can additionally include frame rate reduction. Less obviously, lossy compression of formatted text requires discarding some formatting information

but preserving the actual prose. In all cases, the goal is to preserve information that has the highest semantic value. We refer to this process generically as *distillation.* A distilled object allows the user to decide whether it is worth asking for a *refinement*: for instance, zooming in on a section of a graphic or video frame, or rendering a particular page containing PostScript text and figures without having to render the preceding pages.

2. **Perform adaptation on the fly.** To reap the maximum benefit from distillation and refinement, a distilled representation must target specific attributes of the client. The measurements reported in section 2.1 show that for typical images and rich-text, distillation time is small in practice, and end-to-end latency is reduced because of the much smaller number of bytes transmitted over low-bandwidth links. *On-demand distillation* provides an easy path for incorporating support for new clients, and also allows distillation aggressiveness to track (e.g.) significant changes in network bandwidth, as might occur in vertical handoffs between different wireless networks [39]. We have successfully implemented useful distillation "workers" that serve clients spanning an order of magnitude in each area of variation, and we have generalized our approach into a common framework, which we discuss in section 3.

3. **Move complexity away from both clients and servers.** Application partitioning arguments have long been used to keep clients simple [40]. However, adaptation through a shared infrastructural proxy enables incremental deployment and legacy client support, as we argued in section 1.2. Therefore, on-demand distillation and refinement should be done at an intermediate proxy that has access to substantial computing resources and is well-connected to the rest of the Internet.

Table 3 lists the "axes" of compression corresponding to three important datatypes: formatted text, images, and video streams. We have found that order-of-magnitude size reductions are often possible without destroying the semantic content of an object (e.g. without rendering an image unrecognizable to the user).

Semantic Type	**Specific encodings**	**Distillation axes**
Image	GIF, JPEG, PPM, Postscript	Resolution, color depth, color palette
Text	Plain, HTML, Postscript, PDF	Richness (heavily formatted vs. simple markup vs. plaintext)
Video	NV, H.261, VQ, MPEG	Resolution, frame rate, color depth, progression limit (for progressive encodings)

Table 3: **Three important types and the distillation axes corresponding to each.**

2.1 Performance of Distillation and Refinement On Demand

We now describe and evaluate datatype-specific distillers for images and rich-text.[1] The goal of this section is to support our claim that in the majority of cases, *end-to-end latency is reduced by distillation,* that is, the time to produce a useful distilled object on today's workstation hardware is small enough to be more than compensated by the savings in transmission time for the distilled object relative to the original.

2.1.1 Images

We have implemented an image distiller called *gifmunch*, which implements distillation and refinement for GIF [25] images, and consists largely of source code from the NetPBM Toolkit [35]. Figure 1 shows the result of running gifmunch on a large color GIF image of the Berkeley Computer Science Division's home building, Soda Hall. The image of Figure 1a measures 320 × 200 pixels—about 1/8 the total area of the original 880 × 610—and uses 16 grays, making it suitable for display on a typical handheld device.

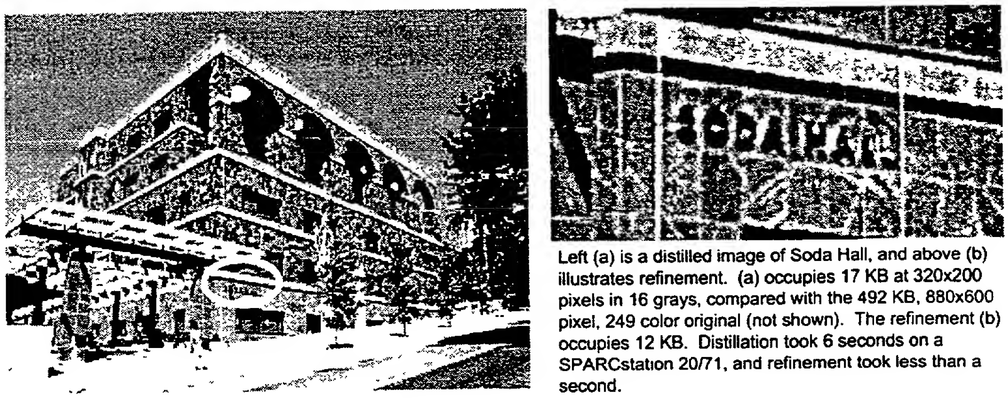
Due to the degradation of quality, the writing on the building is unreadable, but the user can request a refinement of the subregion containing the writing, which can then be viewed at full resolution.

Image distillation can be used to address all three areas of client variation:

- **Network variation**: The graphs in figure 2

---

[1] A distiller for real-time network video streams is described separately, in [1].



Left (a) is a distilled image of Soda Hall, and above (b) illustrates refinement. (a) occupies 17 KB at 320x200 pixels in 16 grays, compared with the 492 KB, 880x600 pixel, 249 color original (not shown). The refinement (b) occupies 12 KB. Distillation took 6 seconds on a SPARCstation 20/71, and refinement took less than a second.

Figure 1: Distillation example

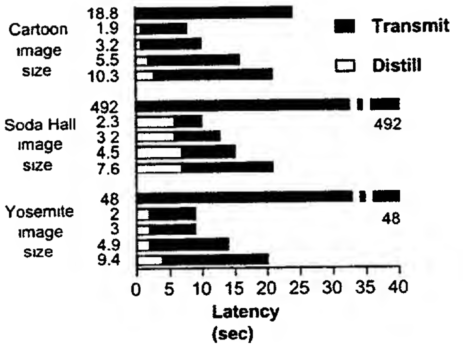


Figure 2: End-to-end latency for images with and without distillation. Each group of bars represents one image with 5 levels of distillation; the top bar represents no distillation at all. The y-axis number is the distilled size in kilobytes (so the top bar gives the original size). Note that two of the undistilled images are off the scale; the Soda Hall image is off by an order of magnitude.

depict end-to-end client latency for retrieving the original and each of four distilled versions of a selection of GIF images: the top set of bars is for a cartoon found on a popular Web page, the middle set corresponds to a large photographic image, and the bottom to a computer rendered image. The images were fetched using a 14.4Kb/s modem with standard compression (V.42bis and MNP-5) through the UC Berkeley PPP gateway, via a process that runs each image through gifmunch. [2] Each bar is segmented to show the distillation latency and transmission latency separately. Clearly, even though distillation adds latency at the proxy, it can result in greatly reduced end-to-end latency. This shows that on the fly distillation is not prohibitively expensive.

- **Hardware variation:** A "map to 16 grays" operation would be appropriate for PDA-class clients with shallow grayscale displays. We can identify this operation as an effective lossy compression technique precisely because we know we are operating on an image, regardless of the particular encoding, and the compression achieved is significantly better than the 2-4 times compression typically achieved by "generic" lossless compression (design principle #1).
- **Software variation:** Handheld devices such as the 3Com PalmPilot frequently have built-in support for proprietary image encodings only. The ability to convert to this format saves code space and decoding latency on the client (design principle #3).

2.1.2 Rich-Text

We have also implemented a rich-text distiller that performs lossy compression of PostScript-encoded

---

[2] The network and distillation latencies reflect significant overhead due to the naive implementation of *gifmunch* and the latency and slow-start effects of the PPP gateway, respectively. In section 3 we discuss how to overcome some of these problems, but it is worth noting that end-to-end latency is still substantially reduced even in this naive prototype implementation.

Feature	HTML	Rich Text	Post-Script
Different fonts	Y	Y	Y
Bold and Italics	Y	Y	Y
Preserves Font Size	head-ings	Y	Y
Preserves Paragraphs	Y	Y	Y
Preserves Layout	N	Y	Y
Handles Equations	N	some	Y
Preserves Tables	Y	Y	Y
Preserves Graphs	N	N	Y

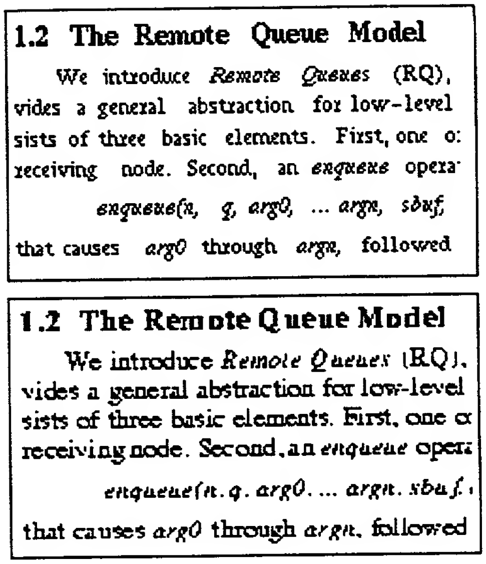
Table 4: Features for postscript distillation

text using uses a third party postscript-to-text converter [34]. The distiller replaces PostScript formatting information with HTML markup tags or with a custom rich-text format that preserves the position information of the words. PostScript is an excellent target for a distiller because of its complexity and verbosity: both transmission over the network and rendering on the client are resource intensive. Table 4 compares the features available in each format. Figure 3 shows the advantage of rich-text over PostScript for screen viewing. As with image distillation, PostScript distillation yields advantages in all three categories of client variation:

- **Network variation:** Again, distillation reduces the required bandwidth and thus the end-to-end latency. We achieved an average size reduction of a factor of 5 when going from compressed PostScript to gzipped HTML. Second, the pages of a PostScript document are pipelined through the distiller, so that the second page is distilled while the user views the first page. In practice, users only experience the latency of the first page, so the difference in perceived latency is about a factor of 8 for a 28.8K modem. Distillation typically took about 5 seconds for the first page and about 2 seconds for subsequent pages.

- **Hardware variation:** Distillation reduces decoding time by delivering data in an easy-to-parse format, and results in better looking documents on clients with lower quality displays.

- **Software variation:** PostScript distillation allows clients that do not directly support PostScript, such as handhelds, to view these documents in HTML or our rich-text format. The rich-text viewer could be an external viewer similar to *ghostscript*, an applet for a Java-capable browser, or a browser plug-in rendering module.



1.2 The Remote Queue Model

We introduce *Remote Queues* (RQ),
vides a general abstraction for low-level
sists of three basic elements. First, one o:
receiving node. Second, an *enqueue* opera·

enqueue(n, q, arg0, ... argn, sbuf,

that causes *arg0* through *argn,* followed

1.2 The Remote Queue Model

We introduce *Remote Queues* (RQ).
vides a general abstraction for low-level
sists of three basic elements. First, one o
receiving node. Second, an *enqueue* oper

enqueue(n. q. arg0. ... argn. sbuf.

that causes *arg0* through *argn*, followed

Figure 3: Screen snapshots of our rich-text (top) versus ghostview (bottom). The rich-text is easier to read because it uses screen fonts.

Overall, rich-text distillation reduces end-to-end latency, results in more readable presentation, and adds new abilities to low-end clients, such as PostScript viewing. The latency for the appearance of the first page was reduced on an average by a factor of 8 using the proxy and PostScript distiller. Both HTML and our rich-text format are significantly easier to read on screen than rendered PostScript, although they sacrifice some layout and graphics accuracy compared to the original PostScript.

2.2 Summary

High client variability is an area of increasing concern that existing servers do not handle well. We have proposed three design principles we believe are fundamental to addressing variation:

- Datatype-specific distillation and refinement achieve better compression than does lossless compression, while retaining useful semantic content and allowing network resources to be managed at the application level.

- When the proxy-to-client bandwidth is substantially smaller than the proxy-to-server bandwidth (as is the case, e.g., in wireless networks or with consumer wireline modems), on-demand distillation and refinement reduce end-to-end latency perceived by the client (sometimes by almost an order of magnitude), are more flexible than reliance on precomputed static representations, and give low-end clients new abilities such as PostScript viewing.

- Performing distillation and refinement in the network infrastructure rather than at the endpoints separates technical as well as economic concerns of clients and servers.

3 Scalable Internet Application Servers

In order to accommodate compute-intensive adaptation techniques by putting resources in the network infrastructure, we must address two important challenges:

1. Infrastructural resources are typically shared, and the sizes of user communities sharing resources such as Internet Points of Presence (POP's) is increasing exponentially. A shared infrastructural service must therefore *scale* gracefully to serve large numbers of users.

2. Infrastructural resources such as the IP routing infrastructure are expected to be reliable, with availability approaching 24 × 7 operation. If we place application-level computing resources such as distillation engines into this infrastructure, we should be prepared to meet comparable expectations.

In this section, we focus on the problem of deploying adaptation-based proxy services to large communities (tens of thousands of users, representative of the subscription size of a medium-sized Internet Service Provider). In particular, we discuss a cluster-friendly programming model for building interactive and adaptive Internet services, and measurements of our implemented prototype of a scalable, cluster-based server that instantiates the model. Our framework reflects the implementation of three real services in use today: TranSend, a scalable transformation proxy for the 25,000 UC Berkeley dialup users (connecting through a bank of 600 modems); Top Gun Wingman, the only graphical Web browser for the 3Com PalmPilot handheld device (commercialized by ProxiNet); and the Inktomi search engine (commercialized as HotBot), which performs over 10 million queries per day against a database of over 100 million web pages. Although HotBot does not demonstrate client adaptation, we use it to validate particular design decisions in the implementation of our server platform, since it pioneered many of the cluster-based scalability techniques generalized in our scalable server prototype.

We focus our detailed discussion and measurements on TranSend, a transformational proxy service that performs on-the-fly lossy image compression. TranSend applies the ideas explored in the preceding section to the World Wide Web.

3.1 TACC: A Programming Model for Internet Services

We focus on a particular subset of Internet services, based on ***transformation*** (distillation, filtering, format conversion, etc.), ***aggregation*** (collecting and collating data from various sources, as search engines do), ***caching*** (both original and transformed content), and ***customization*** (maintenance of a per-user preferences database that allows workers to tailor their output to the user's needs or device characteristics).

We refer to this model as TACC, from the initials of the four elements above. In the TACC model, applications are built from building blocks interconnected with simple API's. Each building block, or ***worker***, specializes in a particular task, for example, scaling/dithering of images in a particular format, conversion between specific data formats, extracting "landmark" information from specific Web pages, etc. Complete applications are built by ***composing*** workers; roughly speaking, one worker can ***chain*** to another (similar to processes in a Unix pipeline), or a worker can ***call*** another as a subroutine or coroutine. This model of composition results in a very general programming model that subsumes transformation proxies [22], proxy filters [43], customized information aggregators, and search engines.

A ***TACC server*** is a platform that instantiates TACC workers, provides dispatch rules for routing network data traffic to and from them, and provides support for the inter-worker calling and chaining API's. Similar to a Unix shell, a TACC server provides the mechanisms that insulate workers from having to deal directly with low-level concerns such as data routing and exception handling, and gives workers a clean set of API's for communicating with each other, the caches, and the customization

database (described below). We describe our prototype implementation of a scalable, commodity-PC cluster-based TACC server late

United States Patent & Trademark Office

Office of Initial Patent Examination -- Scanning Division

Application deficiencies found during scanning:

☑ Page(s)__________ of Abstract were not present for scanning.
(Document title)

☐ Page(s)__________ of ____________________ were not present for scanning.
(Document title)

☐ ***Scanned copy is best available.***